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Recognition and Modernisation of Professional Qualifications in Inland Navigation

Technical support for an impact assessment
Final Report

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PART 1: INTRODUCTION AND SCOPE



1 Introduction

1.1 Introduction harmonization of professional requirements

The Directorate General for Mobility and Transport (DG MOVE) is preparing an impact assessment that examines options towards the recognition of professional qualifications in inland navigation. This is a basis for the proposed EU legal instrument.

This report contributes to this impact assessment regarding the recognition of professional qualifications in inland navigation.

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- STC B.V.;
- Bundesverband der Deutschen Binnenschifffahrt e.V. (BDB).

1.2 Technical assistance and expert group meetings

This report follows another report on the 'Contribution to the problem definition in the context of the Impact Assessment'¹.

In the process of realisation of this report and the above mentioned reports, consultation of external experts and stakeholders has taken place through:

- regular meetings with the Expert Group E01036 Recognition and modernisation of professional qualifications in inland navigation;²
- a questionnaire sent to the members of the Expert Group E01036;
- public consultation through an online questionnaire.³

The following groups of stakeholders, represented in the Expert Group E01036, are consulted:

- Intergovernmental organisations involved in legislative activities regarding inland waterway transport, in particular the international river commissions: Central Commission for Navigation on the Rhine (CCNR), Danube Commission (DC), and the United Nations Economic Commission for Europe (UNECE);
- National administrations – national EU Member States' competent authorities in charge of IWT policy-making and legislative and administrative activities;
- Professional organisations: European Barge Union (EBU-UENF) – representing the interests of the barge owners and barge operators of eight European countries, and the European Skippers Organisation (ESO) – representing the interests of private European inland shipping entrepreneurs;
- Trade unions: European Transport Workers' Federation – IWT section;
- PLATINA – Platform for the implementation of NAIADES – the Leader of the 'Jobs & Skills' Working Package (WP3);
- IWT Training and education institutions in Europe – EDINNA;

¹ Panteia et al. (2014), Contribution to the problem definition in the context of the preparation of the Impact Assessment regarding the recognition of professional qualifications in inland navigation [add web link once established]

² This Expert group is co-chaired by the European Commission (EC) and CCNR.

³ European Commission (2013), Public consultation regarding the recognition and modernisation of professional qualifications in inland navigation (open for the period 26 March 2013 – 21 June 2013).



The findings in this report are largely based on desk research and additional interviews with stakeholders. Where relevant, Panteia's own research data were utilised or non-public data files were used that were made available by public authorities from Member States. For further reference to the input used for this study, see the footnotes in this report and the Bibliography.

1.3 Context, evaluation of relevant directives and problem analysis

1.3.1 Context and evaluation of relevant directives

The initiative on the recognition and modernisation of professional qualifications in inland navigation is one of the measures required to accomplish the single market in the inland waterway transport (IWT) sector and is as such also included in the recent Commission Communication 'Towards quality inland waterways transport - NAIADES II'⁴. It aims at reducing barriers to labour access and mobility, valorise qualifications and careers in the sector, and create a level playing field.

The policy field affected by this initiative is partially regulated by Directive 96/50/EC on mutual recognition of boatmasters certificates. This Directive is limited in its scope of application, as it concerns boatmasters exclusively, does not address the problem of different training and experience requirements for IWT workers in the EU and does not cover the river Rhine as well as the non-EU member states on the Danube.

With regard to IWT professions under the level of a boatmaster, there is hardly any comparable and specific EU legislation in force. In theory, the IWT crew members would need to rely on application of the Directive 2005/36/EC on the recognition of professional qualifications. However, applying Directive 2005/36/EC would represent a lengthy and burdensome exercise for the applicants. First of all, Directive 2005/36/EC covers boatman as a key qualification on all European waterways, but does not describe IWT professions; it only mentions IWT activities in a general way. As the IWT professions under the level of boatmaster are not described in the Directive 2005/36/EC and detailed descriptions and comparable training and qualification profiles in IWT are missing in this context, these professions do not fall under the system of automatic recognition of 2005/36/EC. The request for recognition of qualifications would therefore need to be submitted in each Member State separately with possible compensation measures imposed, each time in a different way. Therefore recognition of qualifications in IWT through Directive 2005/36/EC has been pursued in a very limited way in the past⁵. This approach does of course not include a European harmonisation of qualifications.

The main regulatory actors in the sector at international level are the CCNR (Central Commission for the Navigation of the Rhine), the EU, the Danube Commission and the UN-ECE (United Nations Economic Commission for Europe). Each organisation has a different (but to an extent overlapping) geographical scope and their legislation/resolutions set different requirements for IWT crew member qualifications. Of the main actors, the CCNR covers about half of all IWT personnel in Europe and has achieved the highest level of harmonisation, whereas the UN-ECE has the largest geographical scope but the lowest level of harmonisation. Besides the different geographical scope, the various regulators also have different mechanisms for

⁴ European Commission (10 September 2013), Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Towards Quality Inland Waterway Transport: NAIADES II', COM(2013) 623 final

⁵ At least, there is one known case of a decision taken in 2012, regarding a helmsman from Germany that wished to establish in Poland.



implementing their policies. For example, the CCNR Regulations and EU Directives are binding, whereas Danube Commission Recommendations and UN-ECE Resolutions are not. However, DC's decisions are recognized and implemented within its member states as the member states themselves express their political will through their participation at the plenaries and the decision-making processes. The Sava Commission has issued binding resolutions on qualifications of nautical personnel and set rules on minimum requirements for the issuance of boatmaster's licences on the Sava river basin with the smallest number of persons covered by such regulation.

CCNR has established a number of bilateral agreements and a multilateral agreement on the mutual recognition of boatmaster certificates and of service record books, involving the CCNR member states on the one hand (Germany, The Netherlands, France, Belgium, and Switzerland) and a number of non-CCNR EU Member States on the other hand (Austria, Bulgaria, Hungary, Poland, Romania, the Czech Republic and Slovakia). Following these agreements, the certificates of boatmasters and the experience and the physical and mental fitness recorded in the service record books are in principle recognised by all participating states. In order to find pragmatic solutions for any possible case that has so far caused practical problems, CCNR allows extra time to solve problems of bearers of former service record books issued by CCNR Member States for nationals of the partner countries until 1st July 2015. In this respect, branch organisations have not reported problems after mid October 2013 anymore.

For boatmasters, the bilateral agreements between the CCNR and some Non-Rhine EU MS on mutual recognition of boatmasters' certificates are reported to be operational, even if barriers to the mobility of boatmasters continue to exist. For other crew members, the multilateral agreement on the recognition of service record books has been signed more recently (December 2010) and is also reported to start functioning, although some problems have been reported on different interpretation on the legal implications of the agreement⁶.

1.3.2 Problem analysis

In the report 'Contribution to the problem definition in the context of the Impact Assessment'⁷, the main problem identified is that the IWT labour sector is hampered by a number of obstacles characterised by deficits related to requirements for qualification of IWT workers, which also negatively affects the safety level.

The following barriers to labour mobility are identified:

- Difficulties with mutual recognition of professional qualifications due to different requirements for professional qualifications of workers within the inland navigation sector (requirements for experience, exam programmes, physical and mental fitness)⁸
- Difficulties with recognition of relevant professional qualifications of workers from outside the sector (such as the maritime or fishing sector)
- Knowledge of Specific Situations (KSS) may prevent boatmasters to operate on a certain stretch (relevant for boatmasters only)

⁶ Panteia et al. (2013), Evaluation of the framework of relevant directives related to the initiative on recognition and modernisation of professional qualifications in inland navigation

⁷ Panteia et al. (2014), Contribution to the problem definition in the context of the preparation of the Impact Assessment regarding the recognition of professional qualifications in inland navigation.

⁸ Ibid



- Difficulties with the recognition by national authorities of Service Record Books (SRBs) or of the information contained in the SRB's.

The following problem drivers with regard to safety in IWT are identified, as they are the reason why accidents in the IWT sector are mainly caused by human errors:

- The standards for professional training set at national level have not kept up with technological development
- Language problems

The main problem is substantiated in the study 'Contribution to the problem definition on the context of the preparation of the impact assessment regarding the recognition of professional qualifications and training standards in inland navigation (2014)'.

1.3.3 *Main affected stakeholders*

The main affected stakeholders are:

- Directly, the IWT industry, namely the professionals (boatmasters, boatmen and other crew members), but also ship owners, barge operators, shipping companies, the professional organisations and the logistics industry;
- Indirectly, the national administrations in charge of the IWT policy-making, River commissions, UNECE and law enforcement, the European trade unions of the inland navigation sector.

1.4 **Content of this document**

This document is built up out of four parts:

- Part 1: Introduction and scope. It is composed of this chapter and continues hereafter with Chapter 2 on Impact Assessment methodology
- Part 2: Policy measures. It is composed of Chapter 3 on the envisaged policy measures that can be taken.
- Part 3: Assessment. It is composed of Chapter 4 to 10 and describes the impacts of the policy measures. Chapter 11 describes the synergetic effects of combinations of measures.
- Part 4: Overview of effect of policy measures, followed by conclusions and recommendations. Chapter 12 contains overview tables with the impacts of the measures. This part also contains a Chapter 13 that describes an option on how the implementation of the measures can be organised by reinforced cooperation through CCNR bilateral and multilateral agreements. Lastly, Chapter 14 contains the conclusions and recommendations.

In the Annexes, background data and calculations are included that form part of the input for this study.



2 Problem drivers, impact areas and IA approach

In this chapter, the problem drivers and possible impact areas are specified. Of each problem driver, estimation is made of the amount of IWT workers involved. Together with an estimation of the size of impact for the various impact areas, a matrix is presented, that shows the most important problem driver- impact area combinations. This is where the main focus of the assessment is put. If possible, the assessment will be done in a quantitative way. Where this is not possible, a qualitative assessment will be done. In case of a quantitative assessment, costs and benefits will be expressed in monetary terms where possible.

2.1 Problem drivers and impact area

The problem drivers are included in the following Table 2.1. For each problem driver, estimation is provided of the amount of workers that may be affected.

Table 2.1: Problem drivers and amount of workers affected

<i>Problem driver</i>	<i>Description of amount of Inland Navigation workers affected</i>	<i>Estimated amount of affected workers</i>	<i>Chapter</i>
PD 1: Difficulties with mutual recognition of professional qualifications of workers from within the IWT sector	Whole sector, in particular IWT workers whose qualifications and experience are not mutually recognized	43,826	5
PD 2: Difficulties with mutual recognition of relevant professional experience of workers from outside the sector (e.g. maritime sector)	Yearly inflow from maritime sector	50	6
PD 3: Knowledge of specific situations(KSSs) may prevent boatmasters from sailing on a certain stretch	Yearly inflow of new boatmasters and the existing boatmasters using the current pilotage service	40 per year from new inflow 550 in one shot	7
PD 4: Difficulties with the recognition by national authorities of Service Record Books (SRBs) or of the information contained in the SRB's	All operational workers whose SRB is not recognized on the respective national waterway.	4,750	8
PD 5: The standards for IWT education set at national level have not kept up with technological development	Depending on specific measures the group affected yearly varies from whole sector to only inflow from training institutes	300 – 43,826	9
PD 6: Language problems	Depending on specific measures the group affected yearly varies from whole sector to only inflow from training institutes	300 – 43,826	10

Source: Panteia (2014)



Possible impact areas, to be further investigated, are included in the following Table 2.2. In the subsequent chapters, this is further investigated.

Table 2.2: Impact areas and estimated magnitude of impact

<i>Impact area</i>	<i>Estimated magnitude of impact</i>
Development of the inland navigation sector (in terms of growth of tonnage/passengers, quality of the profession, increased modal share)	Virtually no effect
Competitiveness of the inland navigation sector vis-à-vis other transport modes	Virtually no effect
Employment and job creation in inland navigation	Small effect
Improved mobility within the inland navigation labour market	Significant effect
Improved job quality/ job attractiveness	Significant effect
Functioning of the internal market and fair competition	Significant effect
Impact on Small and medium-sized enterprises (SME)	Small effect
Administrative burden / regulatory costs	Significant
Safety	Significant
Environment/reduced fuel use	Virtually no effect
Consumers	Virtually no effect
Third countries	Virtually no effect

Source: Panteia

In addition to the above-mentioned impact areas, investment costs are added to this list. In sum, investment costs are considered to have an important effect. In a number of cases, investment costs may be identical to regulatory costs. Where this is the case, this will be indicated in order to avoid double counting.

2.2 First prioritization: quantitative/ qualitative (matrix – coloured)

In order to come to a first ranking of problem driver-impact combinations, the estimated amount of workers affected and the estimated impact are compared. This leads to Table 2.3. This table gives an impression of the combinations that are likely to have a larger impact.



Table 2.3: Ranking of important problem driver-impact area combinations

	Investment costs	Development of the inland navigation sector (growth tonnage/passengers, increased modal share)	Competitiveness of the inland navigation sector v/s-à-vis other transport modes	Employment and job creation in inland navigation	Improved mobility within the inland navigation labour market	Improved job quality	Functioning of the internal market and fair competition	Impact on Small and medium-sized enterprises (SME)	Administrative burden / regulatory costs	Safety	Environment/reduced fuel use	Consumers	Third countries
PD 1: Difficulties with mutual recognition of professional qualifications of workers from within the IWT sector													
PD 2: Difficulties with mutual recognition of relevant professional experience of workers from outside the sector (e.g. maritime sector)													
PD 3: Knowledge of specific situations (KSSs) may prevent boatmasters on a certain stretch													
PD 4: Difficulties with the recognition by national authorities of Service Record Books (SRBs) or of the information contained in the SRB's													
PD 5: The standards for IWT education set at national level have not kept up with technological development													
PD 6: Language problems													

Legend		monetisation
		quantitative
		qualitative
		qualitative, insignificant

Source: Panteia.

In the analysis, the focus will lie on the policy measures that have a significant impact and that can be quantified (the red/orange areas). Where this is not possible and impacts are considered significant, a qualitative treatment will be performed. Impacts that are considered insignificant according to a more general analysis in Chapter 4 are discarded.

In the remainder of this analysis, the mobility within the inland navigation labour market and functioning of the internal labour market and fair competition will be dealt together as these aspects overlap.



2.3 Demand/supply model for IWT labour market

In the report 'Contribution to the problem definition in the context of the Impact Assessment'⁹, a labour market model was set up that takes account of the demand for IWT workers on the one hand and the supply of IWT workers on the other hand. This was done for the EU as a whole and for different IWT corridors, so that regional differences in the demand/supply gap over time can be identified. Further, the model distinguishes between different age groups and functions (boatmasters and operational workers).

In order to evaluate the measures proposed, different variants of the demand/supply model have been developed, all based on the model developed in the aforementioned Problem Analysis report. Annex 4 includes a detailed description of the demand/supply model.

2.4 Calculation of the Net Present Value of measures

In order to calculate the Net Present Value of the measures proposed, a discount rate of 4% was applied¹⁰.

⁹ Panteia et al. (2014), Contribution to the problem definition in the context of the preparation of the Impact Assessment regarding the recognition of professional qualifications in inland navigation.

¹⁰ European Commission (2009), Impact Assessment Guidelines



PART 2: POLICY MEASURES



3 Identification of policy measures per problem driver

In this chapter, the policy measures are described in more detail. This will be done for each of the six problem drivers that have been identified in Chapter 2.

3.1 Problem driver 1: Difficulties with mutual recognition of professional qualifications of workers from within the IWT sector

For boatmasters

1.1 Maintain the current system (BAU = business as usual scenario)

Different requirements for CCNR countries and other EU countries, only mutual recognition of boatmaster certificates between CCNR Member States and non-CCNR Member States if bilateral agreements have been concluded.

1.2 Extension of the existing types of boatmaster certificates on the European territory

Next to the existing system in the EU framework (Boatmaster certificate A and B, knowledge of specific situation, radar, passenger and dangerous goods), the following additional categories of boatmaster certification will be introduced in the EU framework:

1.2.1 Basic boatmaster certificate for vessels between 20m and 40m

1.2.2 Boatmaster certificate¹¹ for large convoys (more than 6 barges)

1.3 Introduction of EU wide minimum requirements to obtain boatmasters' certificates

1.3.1 Age:

1.3.4.1 Minimum age: 21 years, but MS can issue boatmasters' certificates at 18

1.3.4.2 Minimum age: 21 years (CCNR)

1.3.2 Renewal of proof of physical and mental fitness:

1.3.2.1 Additional medical examination every year after 65 years (Directive)

1.3.2.2 Additional medical examination every 5 years between 50-65 years & every year after 65 year (CCNR)

1.3.2.3 Additional medical examination at the age of 60, 65 and 70 & afterwards every two years (cfr Dutch demand/study)

1.3.3 Minimum professional experience

1.3.3.1 Extend the approach of the current Directive to the whole EU, without exception for the Rhine: Minimum 4 years of professional experience as a member of the deck crew on an inland waterway vessel. This minimum experience may be reduced by a maximum of 3 years:

- Where the applicant has a *diploma* recognized by a competent authority which confirms specialised training in inland navigation comprising practical

¹¹ Not under the format of a separate certificate but of a special mention on an existing boatmaster certificate (like for radar).



navigation work. The reduction may not be greater than the duration of the specialised training

- Where the applicant has passed a *practical examination* in sailing a vessel: the certificate shall in that case cover only vessels with nautical characteristics similar to those of the vessel which underwent the practical examination

1.3.3.2 Adopt CCNR approach at EU level: Minimum 4 years, including at least 2 years as rating, engine-minder or, at least, 1 year as leading crewman. This minimum experience may be reduced by a maximum of 3 years:

- Where the applicant has a diploma recognized by a competent authority which confirms specialised training in inland navigation comprising practical navigation work. The reduction may not be greater than the duration of the specialised training + definition of the navigation service by setting that 180 days of effective inland navigation shall be considered as one year one navigation service.

1.3.3.3 Adopt a competence based approach¹² to assess the professional experience demonstrated by: minimum 1 year of navigation service (definition to be set) and competence proved by

- Professional training/curriculum certified by school diploma or
- The successful passing of an administrative examination (which may include practical examination or a simulator examination¹³).

1.4 Mutual recognition of all boatmaster certificates in the EU

1.5 Introduction of common, harmonised requirements to obtain an EU certificate

This means that MS can no longer impose more stringent standards for the issuance of certificates in their own country. This would include conversion of existing national certificates within a transition period of 5 years.

For all crew members below the boatmaster rank

1.6 Maintain the current system (BAU) of different function descriptions (CCNR, UNECE, Danube, Sava, no EU system in place) which are not mutually recognized.

Professional experience registered in SRBs is only mutually recognised, if multilateral agreements are in place.

1.7 Mutual recognition of professional function descriptions and professional qualifications, without the harmonisation of function descriptions

This is based on a mapping of the different systems in the EU (to be defined in a Commission delegated/implementing act)

1.8 Harmonization of function names and descriptions/professional qualification+ the introduction for each function description of related EU wide minimum requirements

¹² A list of competence required (for the diploma and for the administrative examination will be defined in a Commission delegated/implementing act)

¹³ Simulators will have to be certified and examination on simulators carried out by a competent authority or an approved body. These examinations will have to be treated as equivalent to practical examinations. Member States will have to mutually recognise the examination carried out on a vessel or on a simulator (detailed rules to be defined in a Commission delegated/implementing act).



Function names may comprise:

1. Deckhand / Apprentice
2. Boatman (equivalent to Matrose, ordinary crewman)
3. Engine-minder
4. Able Boatman (equivalent to Bootsmann, Boatswain, Able crewmen, Volmatroos)
5. Engineer
6. Helmsman
7. Boatmaster: for possible policy measures: see above

MS can still introduce or maintain additional qualifications; however they would not be covered by automatic recognition.

Minimum requirements are related to (to be defined in a Commission delegated/implementing act)

- age
- standard on (renewal of) physical and mental fitness
- standard on professional experience and competencies

1.9.1 Mutual recognition of harmonised function descriptions and professional qualifications.

1.9.2 Introduction and mutual recognition of certificate for engineers and helmsmen at MS level

3.2 Problem driver 2: Difficulties with mutual recognition of relevant professional experience of workers from outside the sector (e.g. maritime sector)

Boatmasters:

2.1 Maintain the current system (BAU):

Different requirements for CCNR countries and other EU countries

2.2 Introduction of EU wide minimum requirements and mutual recognition of the maritime sailing experience needed in order to receive a reduction on the minimum professional experience needed to receive a boatmaster certificate

2.2.1 In line with the current EU system.

the minimum professional experience can be reduced by a maximum of 3 years if proof of at least 4 year experience in maritime navigation as member of the deck crew can be provided

2.2.2 In line with the current CCNR system.

the minimum professional experience can be reduced by a maximum of 2 years if proof can be provided of experience in maritime navigation as member of the deck crew (minimum of 250 days needed per calendar year. The reduction is proportionate (=i.e. equals the maritime experience)

All crew members:

2.3 Maintain the current system of different systems (BAU)

CCNR, UNECE, Danube, Sava, no EU system in place: for the various function descriptions, different rules apply regarding the equivalences between the



experience gained on seagoing vessels and requirements to work as a crew member in IWT sector

2.4 Introduction of EU wide minimum requirements and mutual recognition of the maritime sailing experience needed: partial recognition of corresponding function from the maritime sector into the inland waterway sector ($\frac{3}{4} = 75\%$ of the experience is taken into account

In order to receive a reduction on the minimum professional experience needed to be graded in a certain function description. Cfr the current system in the EU directive for boatmasters where based on 4 years of experience a reduction of 3 years can be obtained.

3.3 Problem driver 3: Knowledge of specific situations (KSSs) may prevent boatmasters to operate on a certain stretch (relevant for boatmasters only)

3.1 Maintain the current situation (BAU):

EU directive: subject to the consultation of the Commission, a MS may require a boatmaster to satisfy additional requirements concerning knowledge of a local situation. Different rules apply for different stretches. Hiring of pilots is possible for the stretches concerned.

3.2 Introduction of relevance criteria to check the necessity of KSSs by MS after conducting risks assessments and taking into account the developments of RIS

- 3.2.1 Hydro-morphology of the sector/river basin
- 3.2.2 Absence of appropriate Fairway Information Services (FIS) on waterways when this implies navigation safety risks due to hydro-morphological characteristics.
- 3.3.3 Presence of a specific local traffic regulation justified by specific hydro-morphological features giving rise to safety concerns.

3.3 Introduction of EU wide minimum standards for the assessment of the knowledge and mutual recognition of the related results

3.4 Minimum standards are to attest boatmasters' KSSs

Verified by means of theoretical exam, practical exam, and examination on simulators, or combination of the previous (to be defined in a Commission delegated/implementing act).

As it is currently the case, MS set their own requirements concerning SSs, but they will have to be proportionate, and not go further than what is necessary to ensure the adequate safety level.

This measure includes the obligation for MS to share information on their KSS requirements in order to ensure that all MS are allowed and entitled to organise the assessment for all KSSs in Europe [Guarantee that the exams are open to all boatmasters within the EU, non-discrimination, removal of language barriers that might derive from examinations]



3.4 Problem driver 4: Difficulties with the recognition by national authorities of Service Record Books (SRBs) or of the information contained in the SRB's

4.1 Maintain the current system (BAU)

No rules at EU level, multilateral agreements between certain EU MS & the CCNR have been concluded in order to ensure mutual recognition of the SRBs

4.2 Harmonization of required information contained in SRBs & mutual recognition of the SRBs

Information requirements to be stipulated in a Commission delegated/ implementing act)

4.2.1 Identification data:

Unique identifier of the SRB; date of issue; issuing authority; the holder's first and last names; the holder's date and place of birth; the nationality and type of identity document presented; the holder's national identification number.

4.2.2 Professional information:

- Physical and mental fitness by a documentary proof: medical certificates
- Professional qualification by a documentary proof: copies of certificates and diplomas: attestation with regards to all qualifications below the boatmaster level
- Sailing time

4.3 Harmonization of required information contained in logbooks & mutual recognition of the logbooks

This will facilitate consistency checking of the SRBs.

4.4 Idem as 4.2 +4.3. + SRB and Logbook need to be electronic (e-SRBs)

obligation to hold an e-SRB for all new IWT workers (requirements to be stipulated in a Commission delegated/implementing act)¹⁴.

3.5 Problem driver 5: The standards for IWT education set at national level have not kept up with technological development

5.1 Maintain the current system of different systems (BAU):

national education systems

5.2 Introduction of a certification system for IWT schools

to ensure quality of teaching, based on STCIN (Standards of Training and Certification for personnel in Inland Navigation) (voluntary option)

5.3 Mutual recognition of diplomas

5.4 Introduction of EU wide minimum standards for the exams

Specific focus on safety (to be defined in a Commission delegated/implementing act)

3.6 Problem driver 6: Language problems

6.1 Maintain the current situation: no EU rules (BAU).

Reference language mainly the country the vessel crosses. (conform Rainwat signed by 17 countries, of which 13 EU Member States)

¹⁴ To be considered: various IT solutions including the possible integration into RIS, different levels of security, organisational and training aspects, rapid or long transition period,...)



6.2 Voluntary implementation of river speak

Standard Inland Navigation Communication Phrases (SINCP)¹⁵

6.3 Mandatory implementation of river speak

- 6.3.1 in IWT education (cfr policy measures 5.4 and 5.5)
- 6.3.2 in the exam program linked to boatmaster certificates (cfr policy measure 1.4.5)
- 6.3.3 in the EU wide minimum requirements for crew below the level of boatmaster (cfr policy measure 1.9: competencies)

¹⁵ The policy measure proposed consist of a voluntary and a mandatory implementation. In case of a voluntary implementation, the penetration rate is expected to be low, and so are the investment costs.



PART 3: ASSESSMENT



4 General issues concerning impact areas

The impact areas as specified in Chapter 3 are a longlist. In this Chapter, a number of these impact areas will be pre-screened in order to show that these areas are considered insignificant. These areas concern:

- modal shift
- development of the inland navigation sector
- environment and reduced fuel use
- consumers

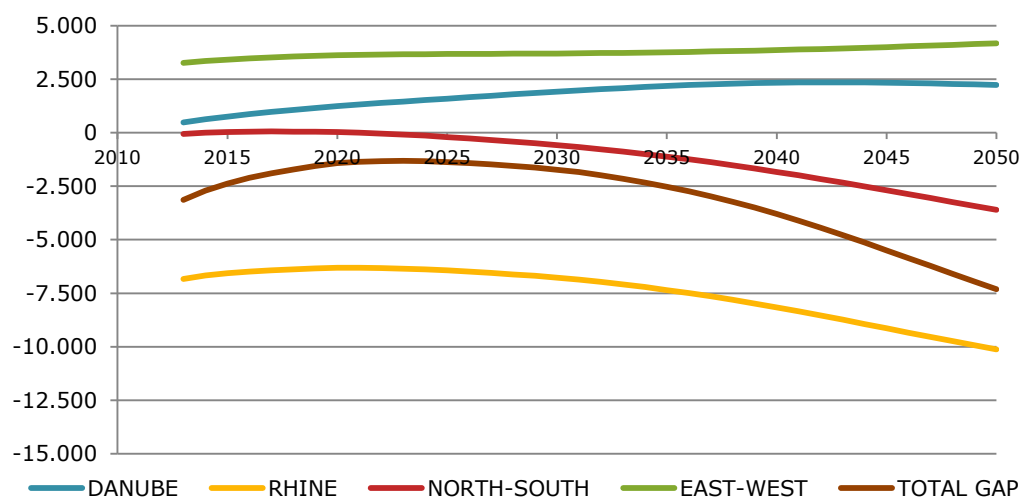
Further, in this chapter, a further elaboration will be provided about what job quality and job attractiveness actually resemble and how the impacts can be determined for this impact area.

4.1 Pre-screening of impact areas that are deemed insignificant

4.1.1 Modal shift

In the report 'Contribution to the problem definition in the context of the Impact Assessment'¹⁶ the baseline development in time of supply and demand of IWT workers in the EU and on specific transport corridors has been determined (See Figure 4.1). In extreme cases, a gap between demand and supply of workers could turn so big that ships may not be allowed to sail, as the required workers cannot be found. Such a case would have a severe impact on the performance of IWT, directly in terms of non-shipped goods but also indirectly because of the negative image that this would cause for the IWT market.

Figure 4.1 Development in time of supply-demand of IWT workers in EU and on specific transport corridors



Source: Contribution to the problem definition in the context of the preparation of the Impact Assessment regarding the recognition of professional qualifications in inland navigation (Panteia, 2014).

¹⁶ Panteia et al. (2014), Contribution to the problem definition in the context of the preparation of the Impact Assessment regarding the recognition of professional qualifications in inland navigation.



It is not very likely that such a scenario will start to exist on a structural basis. From Figure 4.1 it can be seen that gaps between demand and supply develop slowly over a time period that spans decades. In the short run, the so-called 'hidden reserve' may cushion the shortages¹⁷. In the longer run, gaps between demand and supply may emerge more gradually, especially on the Rhine corridor. On the longer term, entry of graduates from workers from IWT training institutes or via an experience path or horizontal entry from other sectors may increase as a reaction to when job conditions improve.

Theoretically, also in the case that gaps are filled there could be an impact on modal shift as a result of higher transport costs due to for example wage increase. However, there has been considerable research done with regards to the price elasticity of an increase in costs in relation to the performance of the IWT sector. Therefore, skippers and transport operators have to pass on benefits and costs in the transport chain to the shippers, in order to lead to a shift from other transport modes to IWT. However, this effect is expected to be very modest, even in cases where costs would differ by as much as 10%. The following studies provide support for this.

- Both PLATINA (2012) and Arcadis & TML (2009)¹⁸ conclude that price elasticities for IWT services are generally low, causing a relatively low modal shift effect in case of changes in the transport prices. PLATINA concluded that transport services are relatively insensitive to changes in prices (direct elasticity between 0 and -1). Transport over longer distances is concluded to be (on average) even less price sensitive than transport over shorter distances.
- Arcadis et al (2009)¹⁹ used elasticities that were based on model results of the TREMOVE-model. The study applied a direct elasticity of -0.25 for inland waterway transport as an average for all commodities, whereas for bulk transport a value of -0.15 was applicable. This means that a cost increase of 10% would lead to a decrease of IWT transport volume by 1.5%.
- Sys and Vanelslander (2011)²⁰ identified a direct price elasticity for IWT on Flemish waterways of -0.34 (a cost increase IWT by 10% leads to 3.4% decline of IWT (tkm) and a cross-mode elasticity between road and IWT of 0.19 (Cost increase road by 10% leads to 1.9% growth of IWT).
- The study of CE et al. (2010)²¹ on the corridor Amsterdam-Paris applied elasticities that ranged between -0.2 and -0.6. The range of elasticities to be used is -0.2 to -0.8 (direct price elasticity for IWT). This means that if total costs per tkm increased by 10%, demand for tkm would decrease by 2 to 8%.

Summarizing the above, benefits due to cost reduction will induce a very modest modal shift compared to the effects that benefit the existing fleet. Therefore, although a modal shift could occur, but in this study the modal shift effects will not be considered as they are virtually zero.

¹⁷ Ibid.

¹⁸ Arcadis & Transport and Mobility Leuven (2009), Impact Assessment Study, reviewing Directive 97/68/EC – Emissions from non-road mobile machinery.

¹⁹ Ibid

²⁰ Sys, C. and T. Vanelslander (eds.) (2011), Future Challenges for Inland Navigation: A Scientific Appraisal of the Consequences of Possible Strategic and Economic Developments up to 2030, University Press Antwerp.

²¹ CE Delft, Alenium, Herry and Infrast (2010), External cost based pricing on the corridor Paris-Amsterdam: Deliverable 2 – Scenarios and impact analysis Final report Delft, Delft.



4.1.2 Development of the inland navigation sector

Development of the inland navigation sector is very much related to the competitiveness of the inland navigation sector vis-à-vis other transport modes. Therefore, alike in 4.1.1, it is not to be expected that the measures will have an effect on the development of inland navigation.

4.1.3 Environment and reduced fuel use

It is not to be expected that any of the measures considered has an impact on environment and reduced fuel use. Currently, there are several instruments available (training courses, AIS) or in development (RIS instruments to guide the full transport chain) that may have an influence on fuel use. The measures that are considered in the context of this IA do not address fuel use. Moreover, it may be expected that operators already in the base case carefully monitor the fuel consumption, as fuel is an important factor in the operational costs of a vessel.

4.1.4 Impact on consumers

In case of any influence of inland navigation on consumers, changes in consumer prices would originate from lower transport costs. The transport operator and the shipper will then have to pass on changes in transport costs to the producer, who should in turn lower the price of the goods shipped. If this would take place, only part of the cost changes would reach the consumer. Furthermore, any possible changes in the price of labour will concern a small proportion of the total transport costs. In turn, the price of transport concerns a small proportion of the price of goods. Therefore, it is not likely to expect that these benefits will significantly impact consumers. It is more likely that small changes due to labour costs will be absorbed by either transport operators or shippers, before they reach the consumer.

4.2 Determinants of job quality / job attractiveness

One of the impact areas is job quality/job attractiveness. This study uses a multidimensional concept of job quality referring to those aspects of a job that have an impact on the well-being of workers. Given this demarcation of job quality, two broad dimensions of job quality can be distinguished:

- Employment quality: related to the contractual relationship between employer and employee.
- Work quality: related to the material characteristics of the task performed and the environment within which it is performed. It is concerned with the activity of work itself and the conditions under which it takes place.²²

Table 4.1 shows the aspects of employment- and work quality that can be distinguished.

Table 4.1: aspects of employment- and work quality

<i>Employment quality</i>	<i>Work quality</i>
<ul style="list-style-type: none">• Remuneration and social benefits• Job flexibility (working hours, working time arrangements and time flexibility)• Job security• Employee participation• Skills development	<ul style="list-style-type: none">• Work autonomy• Physical working conditions, health variables and risks of accidents• Psychosocial risk factors• Intensity of work• Meaningfulness of work

Source: European Parliament (2009)

²² European Parliament (2009), Indicators of job quality in the European Union.



The European Parliament has formulated indicators for job quality. An outline of these indicators is shown in Table 4.1. As an example, the impact of harmonisation of education and training on job quality has an influence on a number of these indicators for workers in IWT. Proper training will positively influence work autonomy and participation as well as the way to cope with health implications. For the training institutes concerned, the impacts will be on the development of new learning environments, new types of material and new pedagogies.

Table 4.2: Outline for the development of an European Job Quality Indicator²³ and impact of measures on the various aspects of job quality

<i>Area</i>		Measures					
		<i>Recognition of diplomas</i>	<i>Recognition of experience</i>	<i>Proportional requirements</i>	<i>Safe jobs</i>	<i>Training</i>	<i>Better communication</i>
Work	Work autonomy	X	X				
	Physical working conditions						
	Health implications (physical and psychological)				X		
	Risks				X		
	Pace of work and workload						
	Social working environment						X
	Meaningfulness	X	X	X			X
	On-the-job training					X	
W + E	Participation						
	Opportunities for advancement	X	X				
Employment	Formal training					X	
	Type of contract, stability						
	Working hours						
	Distribution of working hours (unsocial hours, clear boundaries and flexibility)						
	Wage	X	X				
	Social benefits						
	Work autonomy	X	X				
	Physical working conditions						

Source: [#] European Parliament (2009)* Panteia (2014)

²³ Ibid



Measures, as have been specified in Chapter 3, concern the recognition of diplomas and functions, the recognition of experience, setting proportional requirements, striving for safer jobs, training, making people to communicate better (language) and avoiding fraud with documents. All these measures have an impact on job quality. In Table 4.2, a link is made between these measures and on which of the various determinants of job quality they have an influence. In this study, job attractiveness is assumed to be closely connected to job quality. Job attractiveness increases when job quality increases. Furthermore, job attractiveness increases when the effort to acquire a job is in balance with the benefits that a job has to offer.

Other elements of job attractiveness (like wages and social security) are not addressed in the framework of this study.



5 Difficulties with mutual recognition of professional qualifications of workers from within the IWT sector

In this chapter, the impact of the measures concerning the first problem driver (difficulties with mutual recognition of professional qualifications of workers from within the IWT sector) will be assessed. In summary, measures comprise:

On a boatmaster's level

- Certificates for vessels between 20 and 40 metres
- Certificates for large convoys
- No derogation of member states to minimum age for issuing boatmaster licenses
- Medical check-up every year after 65 / every 5 years between 50-65, yearly after 65 / at 60, 65, 70 and every two years hereafter.
- Required professional experience:
 - EU directive rules applicable in the whole EU: 4 years of experience, but experience or training may bring this down to 1
 - CCNR approach applicable in the whole EU: 4 years of experience, but experience or training may bring this down to 2
 - a competence based approach applicable in the whole EU: minimum 1 year of navigation service and competence proved by professional training/curriculum certified or passing of an administrative examination (may include a practical or a simulator examination).
- Mutual recognition of Boatmaster certificates
- Harmonised requirements for a EU certificate

On an operational level

- Mutual recognition of functions and qualifications without harmonization
- Harmonization of function names and qualifications EU minimum requirements, MS may add functions
- Mutual recognition of harmonized function descriptions and professional qualifications
- Introduction + mutual recognition of certificates for engineers/ helmsmen at MS level

5.1 Investment costs

Investment costs are defined as the upfront costs that have to be made to implement a measure.

5.1.1 *Certificates for large convoys*

There are costs incurred for taking this measure, compared to BAU: all the current workers on large convoys will have to issue a certificate, stating they are permitted to operate on such a vessel. However, under the Danube recommendations, these types of certificates are already foreseen in one additional year of professional experience for convoys composed of a pusher boat and more than four barges. If most of the Danube countries would follow these recommendations, they would actually be compliant with the Directive proposal. According the Danube and Sava River Commission, no countries issue such a certificate at this moment.



In order to calculate the effects of this measure, the following methodology has been applied:

Methodology

1. The fleet composition of the Danube Commission has been used in order to determine the amount of pusher vessels²⁴;
2. Based on the average power of large pusher vessels²⁵ (those who are able to push multiple barges upstream on free-flowing rivers) and the average power of smaller pusher vessels²⁶, an estimation has been made of the composition of the pusher vessel fleet of the Danube countries. See Table 5.3;
3. This way, the amount of larger pusher vessels (engine power > 2000 kW) can be estimated;
4. Based on the manning requirements of such large pusher vessels, estimations can be made on the number of boatmasters required;

Table 5.1 provides information on the amount of large pusher vessels on the Danube.

Table 5.1: Estimation of the amount of large pusher vessels (kW > 2000) on the Danube

Country	Pusher vessels	Total KW	Average KW	Total no. <2000 KW	Total no. ≥2000 kW
Austria	10	9,200	920	10	0
Ukraine	73	112,602	1,542	46	27
Moldova	1	1,500	1,500	1	0
Romania	169	183,990	1,089	150	19
Bulgaria	38	36,723	966	36	2
Serbia	40	55,388	1,385	29	11
Croatia	10	5,205	521	10	0
Hungary	26	36,723	1,412	18	8
Slovakia	41	37,668	919	40	1
Total	398	469,799	1,180	331	67

Source: Danube Commission (2010)

Based upon the manning requirements on these large pusher vessels (67, according to Table 5.1), an estimated amount of 244 boatmasters are working on large pushed convoys on the Danube²⁷. Figure 5.1 presents an overview of the nationalities of these workers.

²⁴ Danube Commission, 2012: <http://www.danubecommission.org/uploads/doc/STATISTIC/STATISTICS>

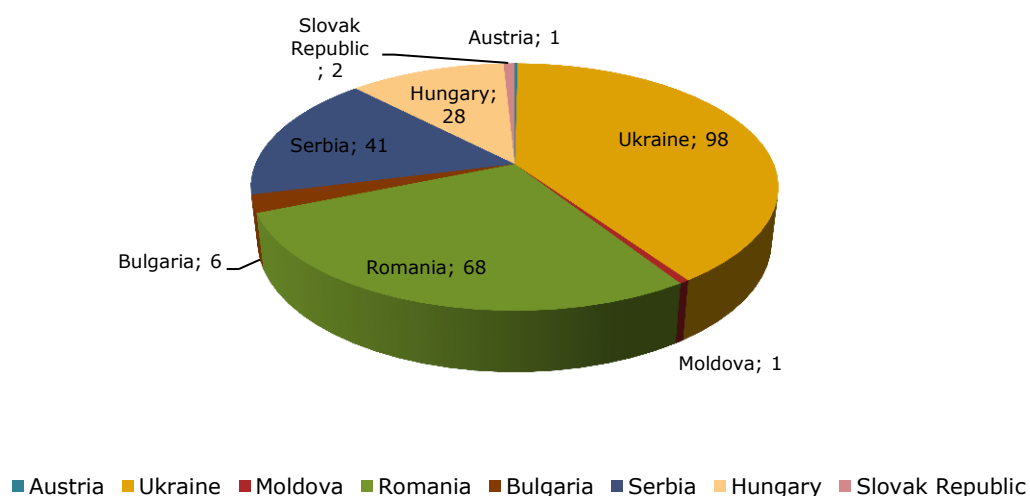
²⁵ The average power of smaller pusher vessels is 895 kW (source: Classificatie en kenmerken van de kenmerken van de Europese vloot en de Actieve vloot in Nederland, Rijkswaterstaat, 2002)

²⁶ The average power of larger pusher vessels is 2,649 kW (source: Classificatie en kenmerken van de kenmerken van de Europese vloot en de Actieve vloot in Nederland, Rijkswaterstaat, 2002)

²⁷ According to the Danube Commission manning requirements, such convoys are obliged to have at least two boatmasters on board. We assume 90% of the vessels being active. Furthermore, there are two shifts of workers to man the vessel all days a year. Thus, 244 (67 * 90% * 4) boatmasters are needed.



Figure 5.1 Origins of current boatmasters of large pushed convoys on the Danube (2014)



Source: Panteia (2014)

Based upon the costs for renewing/enlarging a boatmaster license in the Netherlands (€ 26.15)²⁸, the costs of renewing licenses in other countries have been estimated, using the CPI-factors for government services (see Table 5.2).

Table 5.2: Investments costs occurred for certificates for current boatmasters on large convoys

Country	# Licenses	CPI-factor	Costs / license	Total costs
Austria	1	108,8%	€ 28.46	€ 14.64
Ukraine	98	23,5%	€ 6.15	€ 602.71
Moldova	1	23,5%	€ 6.15	€ 7.71
Romania	68	26,5%	€ 6.93	€ 469.84
Bulgaria	6	23,5%	€ 6.15	€ 34.52
Serbia	41	24,6%	€ 6.42	€ 260.57
Croatia	0	44,1%	€ 11.53	€ -
Hungary	28	38,8%	€ 10.15	€ 282.99
Slovakia	2	42,4%	€ 11.09	€ 22.18
Total	244	26,6%	€ 6.96	€ 1,695.17

Source: Eurostat data on [Price Level Indices](#) and CBR

The total invest costs of this measure can be estimated at € 1,695.17 for 2014. As Serbia, Ukraine and Moldova are no EU Member States, the investment costs for EU countries can be estimated at € 824.18. For non-EU member states, the investment costs can be estimated at € 870.99.

5.1.2 Measures regarding minimum professional experience

Three (mutually exclusive) measures are compared to the BAU scenario:

- The Directive 96/50/EC for the whole of Europe, without exemption on the Rhine; 4 years of experience, but experience, training (three years) or passing a practical exam may bring this down to 1 year. The path only based on experience will take four years.

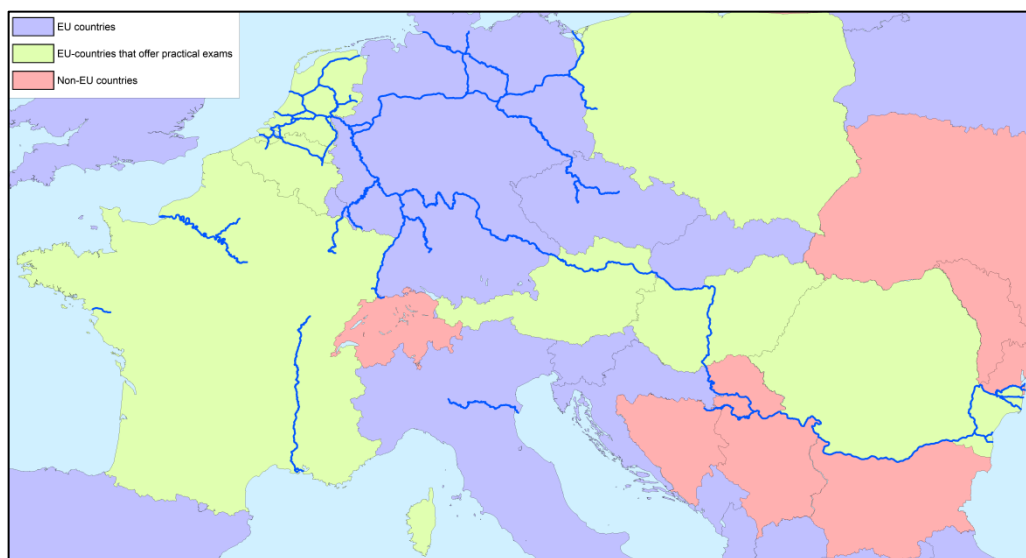
²⁸ CBR Tarievenlijst binnenvaart: <http://www.cbr.nl/download/Tarieven>



- The CCNR standard for the whole of Europe: 4 years of experience, but experience or training (three years) may bring this down to 2 years. The experienced based path will take at least five years²⁹.
- A competence-based approach to assess the professional experience demonstrated by a minimum of one year of navigation service and competence proved by either professional training certified by a school diploma or the successful passing of an administrative exam (which may include a practical or a simulator examination).

Only the competence-based approach will incur investment costs for the development of practical exams. The costs to develop such an exam are estimated at € 100,000 per country³⁰. It includes the development of the exams and programs and investment costs in dedicated training vessels. Currently, such practical exams have already been developed in Austria, Belgium, France, Hungary, the Netherlands, Poland, and Romania. Other countries (Bulgaria, Croatia, Czech Republic, Germany and Slovakia) would need to develop exams and programs, at an approximate cost of € 100,000 per country. See also Figure 5.2. This would lead to an investment costs of € 500,000 (€ 700,000 in case of non-EU countries being included).

Figure 5.2 Overview of countries that offer practical examination.



Source: Panteia (2014), based on NAIADES SWP3.1, Inventory of IWT education and training institutes

5.1.3 Certificates for helmsmen and engineers

In order to estimate the amount of helmsmen and engineers within the IWT sector, the Fleet Development Model as developed by NEA et al. (2011) has been used. This model indicates the amount of helmsman currently active within IWT navigation as 516 and the amount of engineers within IWT as 1,020.

In order to distribute these workers over the nationalities, the proportion has been taken of the total number of operational workers per country in 2014, based upon the labour demand/supply model for operational workers. This leads to estimates on the number of helmsmen and engineers currently affected by this measure. See Table 5.3.

²⁹ CCNR regulations require at least four years of professional experience and at least two years of experience as a boatman. For a non-experienced worker that starts as a deckhand, three years of professional experience (of whom a maximum of two years in maritime) are required before promotion to boatman can be made.

³⁰ Information provided by STC on May 6th, 2014



Table 5.3: Investments costs occurred for certificates for helmsmen and engineers.

Country	# Engineers	# Helmsmen	Total	Costs per certificate	Total investment costs
Netherlands	300	152	451	€ 52.20	€ 23,565
Belgium	26	13	39	€ 61.03	€ 2,366
Germany	169	86	255	€ 51.18	€ 13,034
Poland	15	8	23	€ 21.69	€ 499
France	108	55	163	€ 54.77	€ 8,916
Switzerland	35	18	53	€ 78.46	€ 4,193
Austria	14	7	21	€ 56.81	€ 1,210
Slovakia	12	6	19	€ 22.13	€ 414
Czech Republic	20	10	30	€ 25.94	€ 780
Hungary	25	13	38	€ 20.27	€ 762
Romania	74	38	112	€ 13.84	€ 1,547
Bulgaria	28	14	42	€ 12.28	€ 512
Other EU countries	193	98	291	€52.20	€ 15,178
Total EU costs	1,020	516	1,536	€47.51	€ 72,976

Source: Eurostat data on [Price Level Indices](#) and the maximum tariff of the Netherlands (ILT)

The total investment costs for this measure can be estimated as € € 68,783 for the current workforce of helmsmen and engineer. If Switzerland is included, an extra investment cost of € 4,193 will have to be made, resulting in a total costs of € 72,976.

5.1.4 Other measures

There are no significant investment costs incurred for the other measures as compared to BAU. These measures comprise:

- Certificates for vessels between 20 and 40 metres
- No derogation of MS to minimum age for issuing boatmaster licenses;
- Measures regarding the frequency of medical check-ups;
- Measures regarding recognition of certificates;
- Measures regarding recognition of functions and qualifications.

5.2 Mobility within the inland navigation labour market, functioning of the internal market and fair competition

In case of mutual recognition of professional qualifications, mobility barriers will be removed. The mobility within the inland navigation labour market will therefore improve. In case of all policy measures, mutual recognition will be the envisaged goal.

Measures aimed at boatmasters

5.2.1 Certificates for vessels between 20 and 40 metres

The European fleet comprises 1,983 motorised freight vessels with a length between 20 and 40 metres out of 11,615 self-propelled vessels in total³¹. Besides, there are 802 passenger vessels with these dimensions. Table 5.4 shows information of the flags of these vessels.

³¹ Fleet statistics by the CCNR and Danube Commission.



Table 5.4: Amount of vessels between 20 and 40 metres and their share in the national fleet

Country	# Vessels	Share of fleet	Country	# Vessels	Share of fleet
Austria	1	3%	Hungary	1	8%
Belgium	436	22%	Luxembourg	2	4%
Bulgaria	4	2%	Netherlands	938	9%
Czech Republic	71	12%	Poland	1	1%
France	689	40%	Romania	25	2%
Germany	610	15%	Switzerland	6	4%

Source: IVR database 2013

As mentioned in section 5.1.1, France, the Netherlands and the Sava Commission issue limited licenses. For France, the following numbers were provided on currently valid licenses:

- License valid for vessels smaller than 60 metres: 542³²
- License valid for vessels smaller than 80 metres: 64
- License valid for vessels smaller than 120 metres: 2,119

The Netherlands recorded 73 licenses valid for vessels with a length smaller than 40 metres. The Sava Commission has issued 30 licenses valid for vessels with a length smaller than 35 metres since 2010³³. The CCNR has issued no licenses.

A formula can be determined between the amount of vessels between 20 and 40 metres long, the fleet composition and the amount of limited licenses to be issued:

Box 1: Formula on amount of limited licenses to be issued per country per year

$$N_l = B_l/B_t * \text{INFLOW}$$

N_l = Number of limited licenses to be issued per year;

B_l = Amount of boatmasters on vessels between 20 and 40 metres;

B_t = Total amount of boatmasters needed;

V_l = Amount of vessels between 20 and 40 metres long.

B_l & B_t are determined by manning requirements, fleet composition and operation mode.

Table 5.5 comprises the number of boatmasters on vessels between 20 and 40 metres long and the total number of boatmasters per country, based upon their fleet composition.

Table 5.5: Annual inflow of boatmasters on vessels between 20 and 40 metres.

Country	# Boatmasters on small vessels	Total boatmasters	# Vessels (20m < L < 40 m)	# Yearly Licenses issued
Switzerland	6	427	6	0
France	469	1,237	689	5
Germany	415	3,461	610	4
Netherlands	638	9,014	938	10
Belgium	297	2,101	436	3
Poland	1	23	1	0
Czech Republic	48	313	71	1
Austria	1	75	1	0
Hungary	1	23	1	0
Romania	17	2,787	25	0
Bulgaria	3	547	4	0
Total	1,897	20,077	2,784	25

Source: Panteia (2014)

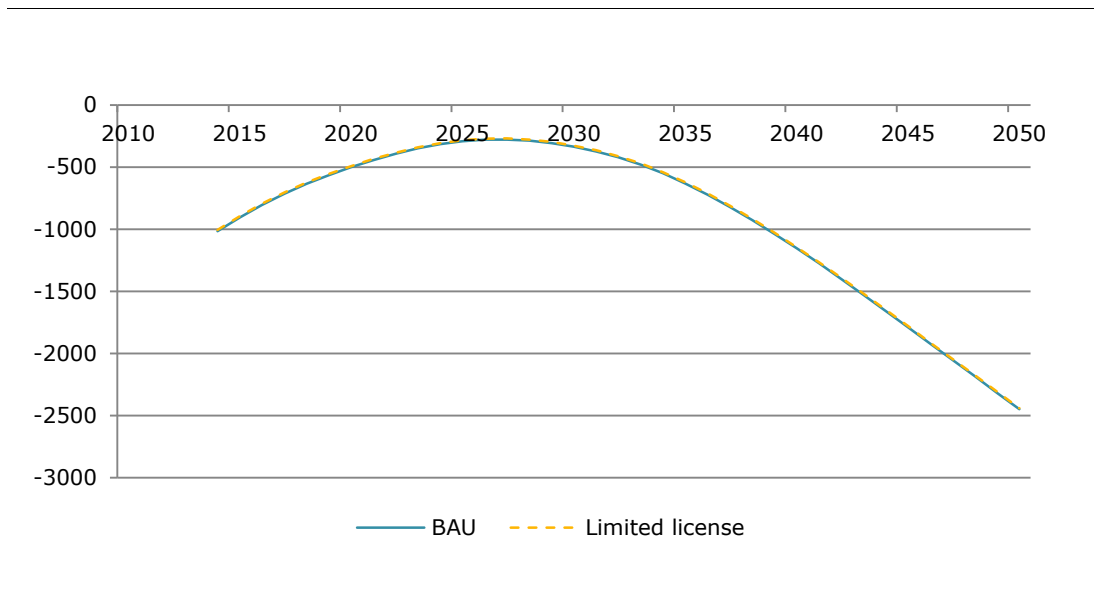
³² There are 230 vessels in France with a length between 40 and 60 metres.

³³ This leaves Freycinet barges (38.5 metres, CEMT I) out of scope.



Figure 5.3 shows the effects of this measure on the labour demand/supply model for boatmasters. As France and the Netherlands already know a system of limited licenses, a potential of additional 10-11 boatmasters per year might issue a limited license for vessels with a length between 20 and 40 metres. Germany, Belgium and the Czech Republic will issue most of these licenses.

Figure 5.3 Effects of certificates for vessels between 20 and 40 metres on the labour demand/supply model for boatmasters (curves almost map onto each other)



Source: Panteia (2014)

This measure will have some influence on new entrants to the sector. After finishing education and/or having done a practical exam, new entrants do not need one year of service as helmsman; they can immediately start as a boatmaster on a vessel with a length between 20 and 40 metres. This will bring benefits to the workers in terms of wage.

Boatmasters from Germany are expected to increase their wages by € 5,613.68 per year. For Belgians, this is slightly higher: € 8,406.48 per year. Boatmasters from the Czech Republic increase their earnings by € 1,832.45 per year.

The Net Present Value of this measure adds up to € 666,498 in 2030 and € 1,045,056 in 2050. There is no significant impact expected for third countries.

It must be noted that this measure only has significant impact if the age limit for a boatmaster certificate for these vessels can be set at a lower age than 21.

5.2.2 Certificates for large convoys

The certificates for large convoys (composed of more than six barges) will require one year of professional experience for boatmasters in order to sail with these convoys. Due to restrictions on the dimensions of convoys, these certificates are only expected up to Komárom (Hungary).³⁴ For an example of a pushed convoy composed of eight barges on the Lower Danube, see Figure 5.4.

³⁴ On the Rhine and Maritime Scheldt, maximum dimensions of convoys compromise 270 metres long and 22.8 metres wide, or a maximum 195 metres long and 34.2 metres wide. This compromises convoys of six Europe II barges. On the Seine, Rhône, Elbe and the Odra, a beam of only 11.4 m wide is allowed.



Figure 5.4 Pushed convoy composed of eight barges on the Iron Gate (Danube)



Source: *Kustvaartforum.com*

On the Rhine-axis and on the North-South and East-West corridor, only convoys composed of a maximum of six barges are allowed, and thus these corridors are left out of scope.

In order to calculate the amount of salary that companies need to pay for workers they cannot use as a boatmaster due to this measure, it is assumed that a boatmaster's salary is paid for a worker that is deployed in the function of helmsman. After one year of service, this worker can be deployed as a boatmaster. However, in order to make the job on a large convoy attractive for a worker, companies still have to pay a boatmasters' salary for a worker that can only be deployed as a helmsman. See section 5.2.5, Box 2 for an example on this topic.

In order to calculate the effects of this measure, the following methodology has been applied:

Methodology

1. The fleet composition of the Danube Commission has been used in order to determine the amount of pusher vessels³⁵;
2. Based on the average power of large pusher vessels³⁶ (those who are able to push multiple barges upstream on free-flowing rivers) and the average power of smaller pusher vessels³⁷, an estimation has been made of the composition of the pusher vessel fleet of the Danube countries. Results are presented in Table 5.3;
3. Following this, the amount of larger pusher vessels (engine power > 2000 kW) can be estimated as around 67 for the Danube fleet;
4. Based upon the Fleet Development Model as used by Panteia et al. (2013)³⁸, estimations have been made on the number of large pusher vessels over time. On the Danube, the number will gradually increase from 67 in 2013 up to 93 in 2050.

³⁵ Danube Commission, 2012: <http://www.danubecommission.org/uploads/doc/STATISTIC/STATISTICS>

³⁶ The average power of smaller pusher vessels is 895 kW (source: Classificatie en kenmerken van de kenmerken van de Europese vloot en de Actieve vloot in Nederland, Rijkswaterstaat, 2002)

³⁷ The average power of larger pusher vessels is 2,649 kW (source: Classificatie en kenmerken van de kenmerken van de Europese vloot en de Actieve vloot in Nederland, Rijkswaterstaat, 2002)

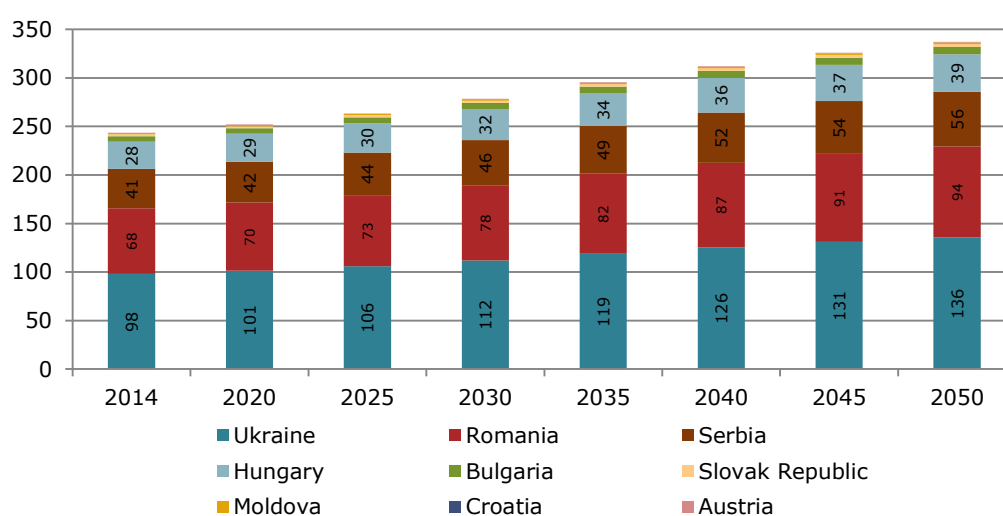
³⁸ Panteia et al, 2013: Contribution



5. Based on the manning requirements of such large pusher vessels, estimations can be made on the number of boatmasters required;
6. Based upon information of the labour demand/supply model of the countries involved, the amount of retiring boatmasters on large pusher vessels can be determined;
7. Based upon the development of the fleet and the amount of retiring boatmasters, the amount of boatmasters that need to be recruited can be determined;
8. These boatmasters are affected by this measure, as they will need one extra year of experience in order to operate on large pusher vessels with more than six barges.

Figure 5.5 shows the origin of boatmasters on large pushed convoys (> 6 barges) on the Danube for various years. Please note the large share of boatmasters from Ukraine.

Figure 5.5 Origin of workers on large pushed convoys on the Danube for various years (2014 - 2050)



Source: Kustvaartforum.com

Table 5.6 shows the average salary of boatmasters and helmsmen on large convoys on the Danube.

Table 5.6: Average yearly salary of boatmaster and helmsman and the wage difference between the functions.

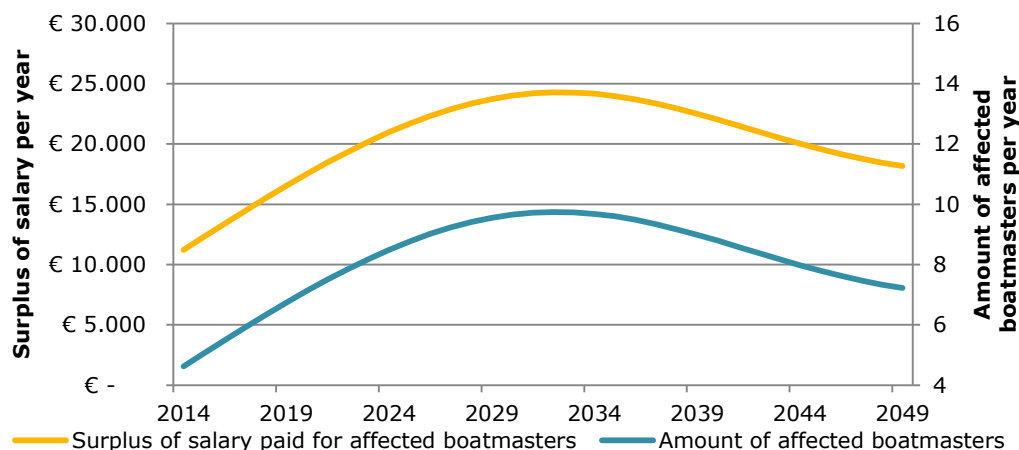
	Salary of boat master	Salary of helmsman	Difference
Austria	€ 91.319,11	€ 69.722,75	€ 21.596,36
Ukraine	€ 7.470,43	€ 5.703,72	€ 1.766,71
Moldova	€ 7.470,43	€ 5.703,72	€ 1.766,71
Romania	€ 17.870,67	€ 13.644,37	€ 4.226,29
Bulgaria	€ 7.470,43	€ 5.703,72	€ 1.766,71
Serbia	€ 17.870,67	€ 13.644,37	€ 4.226,29
Croatia	€ 17.870,67	€ 13.644,37	€ 4.226,29
Hungary	€ 16.901,16	€ 12.904,15	€ 3.997,01
Slovakia	€ 17.471,77	€ 13.339,81	€ 4.131,96

Source: Eurostat data on [Price Level Indices](#) and the maximum tariff of the Netherlands (ILT) (2014)



Figure 5.6 shows the amount of persons involved on the Danube corridor and the total accumulated salary difference for both the EU and Non-EU workers, in order to express the fact that one extra year of experience is needed in order to operate on large pusher vessels with more than six barges.

Figure 5.6: Large convoys: workers involved on the Danube corridor and the total accumulated salary paid for gaps because of boatmasters need to be deployed as helmsmen.



Source: Panteia (2014)

The Net Present Value of this measure counts up to -€ 230,886 in 2030 and -€ 393,519 in 2050. For EU-countries only, the NPV counts up to -€ 116,194 in 2030 and -€ 204,722 in 2050.

5.2.3 No derogation of member states to minimum age for issuing boatmaster licenses

Currently, Member States can derogate from the Directive 96/50/EC on the minimum age to apply for a license. This is currently set at 21, but countries that derogate from this issue those licenses for boatmasters with a minimum age of 18. These licenses will only be valid in Member States that apply the same derogation from the Directive.

Currently, four countries derogate from the Directive. Three of them issue boatmaster licenses if the applicant has a minimum age of 18. These countries are:

- The Netherlands;
- Belgium;
- France.

By this means, operation on the North-South corridor comes into scope for underage boatmasters.

Data collection

The Netherlands was unfortunately not able to provide data on the number of boatmaster licenses issued to people aged under 21. The amount of licenses issued by people aged under 21 has thus been estimated, based upon the distribution rate for



the Netherlands and the North-South corridor³⁹. This figure is 18% for the Netherlands. As not all of these boatmasters will graduate before the age of 19 (students start IWT education generally at the age of 16. After three years of education, they will graduate at the age of 19), a factor of 1/3rd will be applied to estimate the potential. Thus, the percentage of boatmasters being underage when applying for their license can be estimated as around 6.0%. As the yearly inflow of new boatmasters can be estimated as around 140⁴⁰, it can be deducted that about 8 boatmaster will request for licenses at an age younger than 21 year old⁴¹.

France has recorded data on the age of the applicant when applying for the boatmaster license. A total of 219 boatmaster licenses have been issued by applicants aged under 21, upon a total of 4737 boatmaster licenses. This equals a percentage of 4.6% under 21 licenses issued.

For Belgium, the information provided is shown in Table 5.7. This equals a percentage of 7.8% of the total amount of licenses issued.

Table 5.7: Amount of licenses issued by applicants aged under 21 in Belgium.

<i>Year</i>	<i>Amount of licenses issued</i>	<i>Licenses issued by applicants aged under 21</i>
2013	47	4
2012	60	4
2011	26	4
2010	59	3
Total	192	15

Source: Belgian Ministry of Mobility (2014).

Methodology

In the BAU situation, boatmasters can apply for a license starting from an age set by their local authority. In order to evaluate the measure (not allowing exceptions to the minimum age of 21), a new scenario has been created in the Labour Demand model, reducing the yearly inflow to the North-South corridor by:

- 6% for the Netherlands;
- 7.8% for Belgium;
- 4.6% for France;

This way, the amount of people that are denied access to the North-South corridor can be calculated. The economic effects can be evaluated by multiplying the amount of people affected by the wage difference between helmsmen and boatmasters. See Table 5.8.

Table 5.8: Average wage differences between helmsmen and boatmasters

<i>Country</i>	<i>Wage difference</i>
Netherlands	€ 11.870,77
Belgium	€ 17.245,67
France	€ 15.931,90

Source: Panteia (2014), based upon the CAO wage table for the Netherlands (2014) and Eurostat data on [Price Level Indices](#)

³⁹ Panteia (2014), Contribution to the Problem Definition in the context of the preparation of the Impact Assessment regarding the recognition of professional qualifications and training standards in inland navigation, Annex 7.

⁴⁰ Labour demand/supply model on boatmasters.

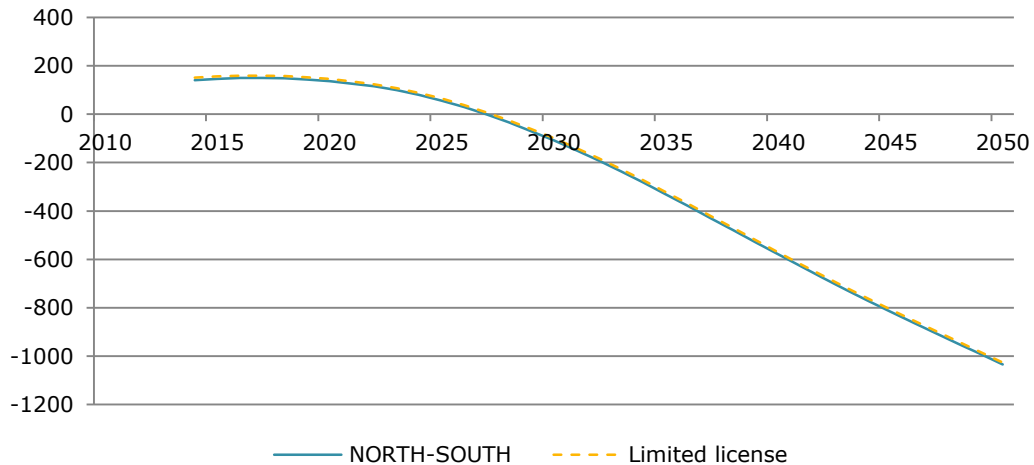
⁴¹ $140 * 1/3 * 18\% = 8$



Results

The results of the measure on minimum age are presented in Figure 5.7. It can be observed that the measure will diminish the workforce on the North-South corridor by 10-11 workers per year.

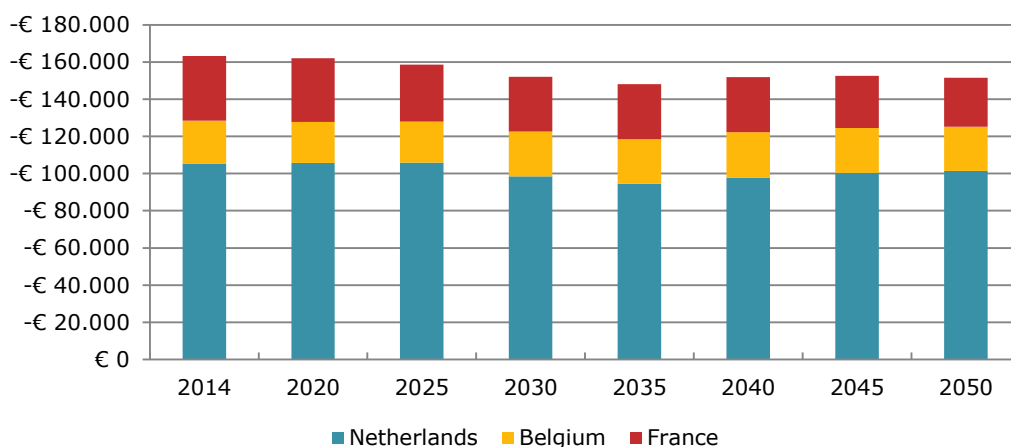
Figure 5.7 Effects of the measure on the gap on the North-South corridor.



Source: Panteia (2014)

The economic effects of the measure can be calculated by multiplying the amount of workers affected by the wage differences. The results of these calculations steps are presented in Figure 5.8 for the countries that belong to the North-South corridor.

Figure 5.8 Effects of the measure on the gap on the North-South corridor.



Source: Panteia (2014)

The Net Present Value of this measure equals - € 2,011,904 in 2030 and -€ 3,107,288 for 2050.



5.2.4 Measures regarding the frequency of medical check-ups.

Here, three (mutually exclusive) scenarios are considered, and compared to BAU:

- Harmonisation in line with 96/50/EC Directive: medical check-up every year after 65
- Harmonisation in line with CCNR approach for medical check-ups: every 5 years between 50-65, yearly after 65
- Harmonisation in line with a proposal from the Netherlands, in short: Dutch proposal, which compromises medical checks at 60, 65 and 70 and hereafter once every two years⁴²;

Methodology

In case the frequency of medical checks is changed, there will be cost differences compared to BAU that can be seen as investment costs. In order to calculate the amount of medical checks per year, the following methodology is used:

1. Continuous age distributions have been derived from the labour demand/supply model, shifting age groups once per year and with regards to new inflow;
2. Based upon the drop-out rates (See Table 5.9), the amount of people disapproved can be calculated per scenario.
3. Comparing these numbers to the BAU, will give an indication of the increase/decrease of workforce due to a stricter or less stringent approach.

The 96/50/EC Directive and the Dutch proposal are less stringent than the BAU. This will mean less medical examinations per year (as discussed in section 5.4.4), but also less persons per year that do not pass the examination. These persons will continue to work in the sector, although they are physically and/or mentally not able to do so. The drop-out rates per age category, dependent on the approach chosen, are presented in Table 5.9.

Drop-out rates vary among the scenario chosen, and are set according to the Expert opinion of ILT. As both the Directive and Dutch proposal comprise less medical check-ups as compared to the current CCNR approach in the Netherlands, this will result in a higher effectiveness of some of the medical checks. A factor 1.5 has been assumed.

Example: Within the CCNR approach, workers will have to be checked once every five years, starting at the age of 50. The Dutch proposal starts with medical checks at the age of sixty. This might result in more disapprovals at the age of 60: if the CCNR approach would have been applied, these workers might already have been disapproved at the age of 50 and/or 55.

⁴² Analyse leeftijdsgebonden medische keuringen binnenvaart, ILT (2013)



Table 5.9: Drop-out rate due to medical check-ups (2014)

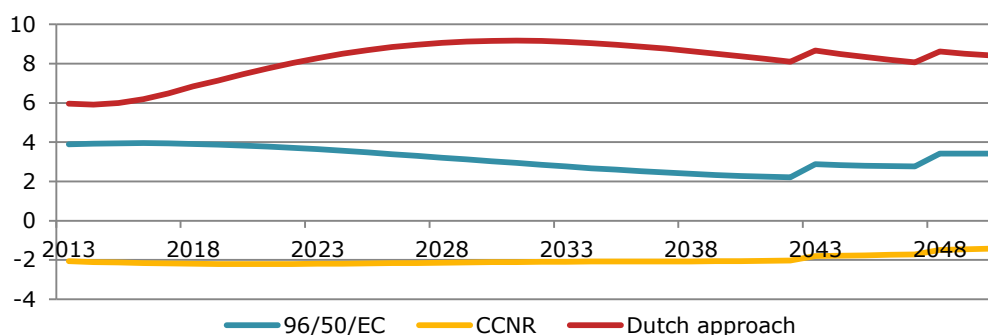
Age	Directive	CCNR	Dutch proposal
50		0.20%	
55		0.20%	
60		0.40%	0.60%
65	0.60%	0.40%	0.40%
66	0.30%	0.30%	
67	0.30%	0.30%	
68	0.30%	0.30%	
69	0.30%	0.30%	
70	0.30%	0.30%	0.45%
71	0.30%	0.30%	
72	0.30%	0.30%	0.45%
73	0.30%	0.30%	
74	0.30%	0.30%	0.45%
75	0.30%	0.30%	
76	0.30%	0.30%	0.45%
77	0.30%	0.30%	

Source: Analyse leeftijdsgebonden medische keuringen binnenvaart, ILT (2013)

By comparing the numbers above, an indication can be given concerning the effects on the workforce in IWT. For instance, the CCNR-approach comprises medical check-ups at the age of 50. However, the Dutch proposal and the Directive start with medical check-ups at the age of 60 respectively 65. This means that less workers will be disapproved if the Dutch proposal or the Directive approach is chosen for a country that is currently applying the CCNR approach. On the other hand, for countries applying the Directive, the regulations on medical check-ups will be more stringent if the CCNR approach is applied throughout Europe: now people aged 50, 55 or 60 can be disapproved. From Table 5.9, it can be observed that this equals 0.2% to 0.4% of the people in those age groups.

In less stringent scenarios, this adds additional workers to the sector compared to the BAU scenario. The Dutch proposal adds 6 to 9 workers to the total IWT workforce; the Directive adds 2 to 4 workers. The stricter CCNR-approach on medical check-ups results in a smaller workforce; a decline of 2 workers can be expected. For the evaluation over time, see Figure 5.9 for the different scenarios compared to the baseline.

Figure 5.9: Difference in workforce and hidden reserve compared to the BAU scenario



Source: Panteia (2014)



5.2.5 Measures regarding minimum professional experience

Three (mutually exclusive) measures are compared to the BAU scenario:

- The Directive 96/50/EC for the whole of Europe, without exemption on the Rhine; 4 years of experience, but experience or training (three years) may bring this down to 1 year. The path only based on experience will take four years.
- The Rhine approach for the whole of Europe: 4 years of experience, but experience or training (three years) may bring this down to 2 years. The experienced based path will take at least five years⁴³.
- A competence-based approach to assess the professional experience demonstrated a minimum of one year of navigation service and competence proved by either professional training certified by a school diploma or the successful passing of an administrative exam (which may include practical or simulator examination)

In the labour demand/supply models, it is assumed that all students that enter IWT education will eventually work in the IWT sector, regardless if they successfully finish their educational program. Based on data collected by STC in 2013, as much as 67.3% to 100% of the students enrolled finish education⁴⁴. Those who don't graduate, obtain their qualifications by acquiring professional experience. We have assumed the proportion of candidates choosing the education based path and the experience based path (with practical exams) to be equal to 85%/15%. This means that 85% of the boatmasters acquire their professional qualifications through education and 15% acquire the boatmaster certificate through experience only. See also Annex 4.

Amount of workers involved

To assess these measures, the boatmaster subset of the supply/demand model has been used. The 'Business as Usual' scenario is composed of the Rhine approach for the Rhine corridor only, and the Directive 96/50/EC for the three other corridors. New entrants to the sector, from IWT training institutes, are given access to the Rhine once they have reached the age of 22. In the two years before (it has been assumed they finish their training at the age of 20), they gain their required professional experience in the function of 'able crewman' and 'helmsman'.

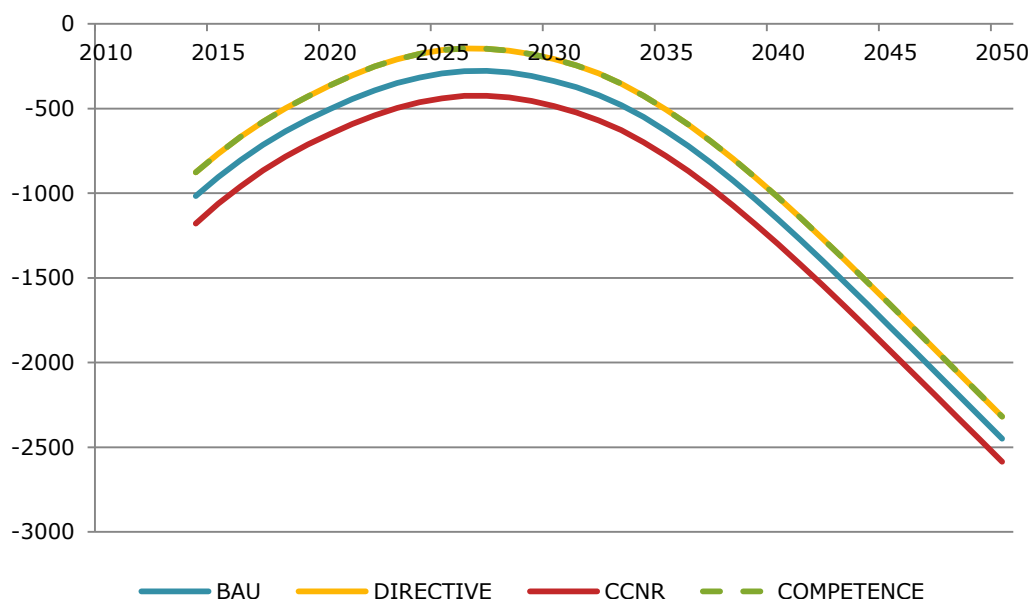
The three scenario's each have a different effect on labour mobility. For companies, it will be more difficult to acquire personnel if the Rhine approach is used, as new entrants to the sector will need two years of professional experience before they can operate in the function they are trained for. On the other hand, the EU approach from Directive 96/50/EC will provide benefits on the Rhine corridor, as workers now only need one year of professional experience after they have graduated, instead of the two years before. The effects on the functioning of the labour market are presented in Figure 5.10. It must be noted that both the current EU standards and the competence based approach score better than the BAU scenario. On the other hand, applying the CCNR-standards throughout Europe will diminish the workforce in IWT.

⁴³ Three years are required to become boatman, and boatmasters will need at least 2 years of professional experience as a boatman. Thus, five years are required.

⁴⁴ Contribution to the problem definition in the context of the preparation of the Impact Assessment regarding the recognition of professional qualifications in inland navigation, Table 2.4.



Figure 5.10: Effects of experience requirements on the functioning of supply/demand of boatmasters in EU and in the specific transport corridors.



Source: Panteia (2014)

Monetization

There are costs incurred for taking this measure compared to BAU: in case of any changes in the minimum experience needed, workers concerned will be less productive for the time that they need to build up the necessary experience. This can be measured by the temporary difference in salary between a boatmaster and a helmsman or boatman, until the required experience has been gained. See Box 2.

Box 2: Example on salary deficiencies

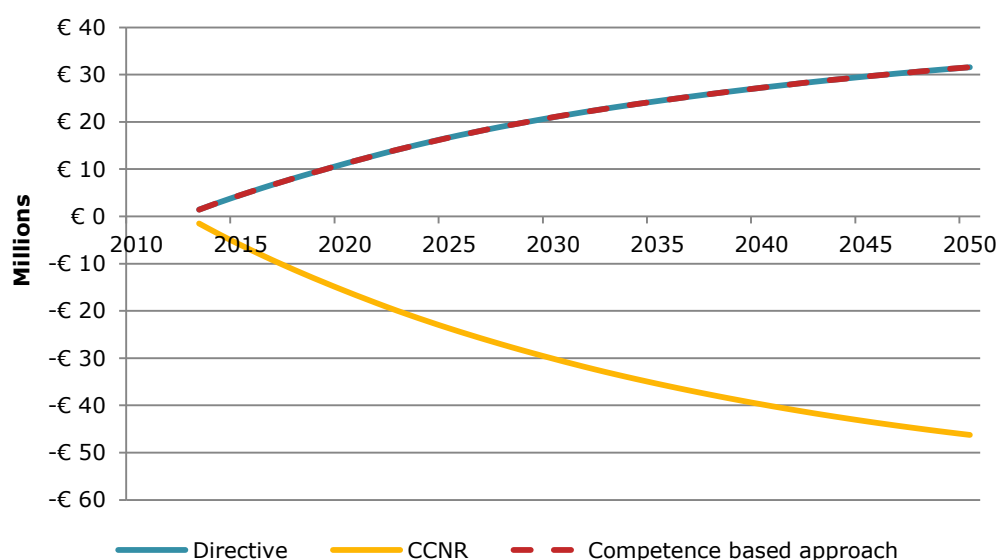
Presently, a worker in IWT can become a boatmaster one year after graduating from the IWT education school. The worker will function as a helmsman for one year, and afterwards he will be promoted to boatmaster if he passes the mandatory exam. Based on the most conservative wage tables of the Dutch CAO, the average monthly salary of a boatmaster is € 2,409.74. For helmsman, this is € 1,870.16. Total earnings in these two years are € 51.358,80.

The CCNR approach awards two years of sailing time for completing an IWT education course. Afterwards, two years of professional experience need to be obtained. The first year, the worker will operate as Able Crewman, which compromises a monthly salary of € 1,207,10. The second year, the worker will promote to helmsman and he will earn € 1,870.16 per month. In the third year, the worker can become a boatmaster if he passes the mandatory exam. Total earnings in these two years are € 36,927.12. The total deficit of the worker will be € 14,431.68, even excluding social expenses.

Figure 5.11 shows the economic effects of the measures. For the current Directive standards and the competence based approach, there is a positive effect with regards to salaries paid to workers that now work on the Rhine, as it will only take one year before they can reach the function of boatmaster, instead of two. Conversely, for all other corridors the CCNR approach will result in a loss of salary, as workers then need to serve one year in the function of able crewman.



Figure 5.11: Economic effects for workers of the measure (including social-security expenses)



Source: Panteia (2014)

EU Countries

The Net Present Value of economic effects of the measures for the current EU-standards and the competence based approach count up to € 20,976,983 (€ 23,352,306 in case of non-EU countries included) when 2030 is used as a time horizon and € 31,566,930 (€ 35,185,927) in case this is 2050. For the CCNR-standards, these figures are € -30,116,885 (€ -30,233,542) and € -46,247,579 (€ -46,431,364) respectively.

5.2.6 Measures regarding recognition of certificates

Since the introduction of the Directive 96/50/EC, the mutual recognition of boatmaster certificates has been extended. Now, all countries connected to the EU inland waterway network mutually recognize the certificates A and B of one another. However, the CCNR does not mutually recognize all national boatmaster certificates issued under Directive 96/50/EC. France is exempted⁴⁵, as well as Croatia. This leaves 658 boatmasters originating from countries connected to the EU interconnected waterway network out of scope of the mutual recognition of boatmaster licenses by the CCNR⁴⁶. The majority of those boatmasters (638) originate from France.

Figure 5.12 shows a breakdown of the amount of boatmaster licenses issued per country per type of the license (Rhine Patent, 96/50/EC license, national license. In order to make an estimation of the amount of active Rhine patents in Europe (6,127), the distribution rate of the labour demand/supply model is applied⁴⁷. The latter is seen as a 96/50/EC or 91/672/EEC license, if no data on the national licenses was available. If this data was available, the total number of issued national licenses has been divided by total number of licenses in that country. See Table 5.9 for the data.

⁴⁵ This is due to the fact that France requires 400 days of professional experience for a boatmaster license, compared to 720 days elsewhere.

⁴⁶ The Danube Commission and the Sava River Commission do recognize boatmaster licenses issued under Directive 96/50/EC.

⁴⁷ Panteia (2014), Contribution to the Problem definition in the Context of the preparation of the Impact Assessment, Regarding the recognition of professional qualifications and training standards in inland navigation, Annex 7



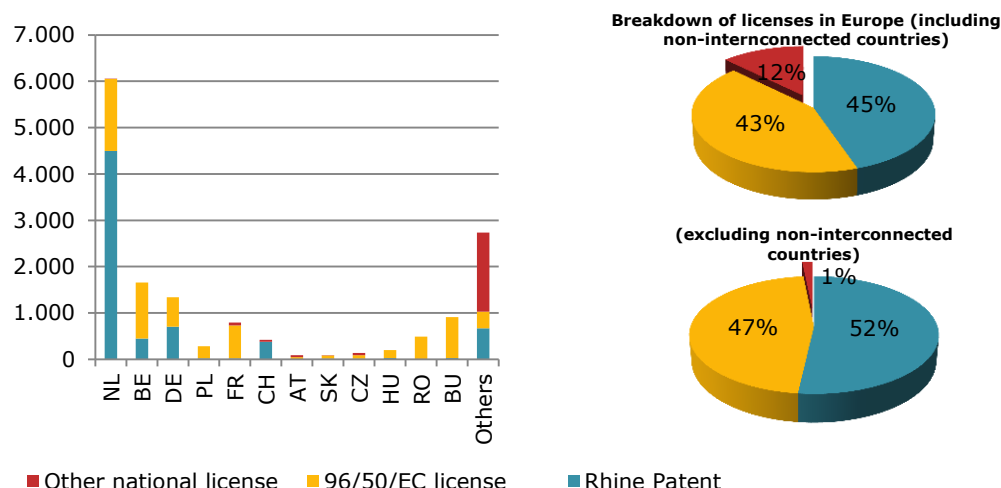
Table 5.9: Data on certificates that fall under the exemption foreseen under art 3.2. of 96/50/EC

	Licences that fall under exemption*	Total number of valid licenses*	Percentage
NL	15	25,760	0.05%
DE	0	4,259	0.00%
CZ	335	945	35.45%
SK	64	726	8.82%
RO	0	621	0.00%
AT	222	432	51.39%
PL	0	1901	0.00%
FR	184	2500	7.36%
UK	3,762	3762	100.00%
LT	0	1542	0.00%

* These differences in the amount of licenses in Table 5.9 and Figure 5.12 exist as Member States have provided the European Commission in 2011 with the total number of valid licenses. Not all of these licenses are used actively anymore. Figure 5.12 comprises the licenses of active boatmasters only. This way, 25,760 can be reported for the Netherlands here and 6,053 in Figure 5.12.

Source: European Commission (2014), based on data provided by Member States in 2011 and French Ministry (2012)

Figure 5.12 Breakdown of the amount of active and valid boatmaster licenses (for boatmasters younger than 65 years) issued per country per type of license



* Other countries include Luxembourg, Italy, the United Kingdom and countries such as Sweden, Finland, etc.

Source: Panteia (2014)

Furthermore, both the CCNR and the countries connected to the EU-inland waterway network do not mutually recognize boatmaster licenses from countries that do not issue boatmaster licenses following the Directive 96/50/EC. This includes countries with a large IWT workforce, such as Italy and the United Kingdom. If Portugal is added to these, 1,608 boatmaster certificates are left out of scope. The CCNR does not mutually recognize boatmaster licenses from all EU-countries that are not connected to the inland navigation network, although issuing certificates in line with EU Directive. By this means, countries such as Sweden, Finland, Lithuania and Estonia are left out scope. These countries have an IWT boatmaster workforce of 309 boatmasters. See Table 5.11 for countries that mutually recognize the boatmaster licenses of one another.



Table 5.11: Comparison table for the mutually recognition of boatmaster license per country / river commission and country / river commission where the license is issued.

Recognizes →	AT	BE	BG	CZ	HR	FR	DE	HU	LU	NL	PL	CCNR	RO	RS	SK	CH	UA	UK	IT	SE	PT	FL	LT	EE
Austria	x	x	x	x	x	x	x	x		x	x	x	x	x	x		x			x		x	x	x
Belgium	x	x	x	x	x	x	x	x		x	x	x	x		x					x		x	x	x
Bulgaria	x	x	x	x	x	x	x	x		x	x	x	x	x	x		x			x		x	x	x
Croatia	x	x	x	x	x	x	x	x		x	x	x	x	x	x		x			x		x	x	x
Czech Republic	x	x	x	x	x	x	x	x		x	x	x	x		x					x		x	x	x
France	x	x	x	x	x	x	x	x		x	x	x	x		x					x		x	x	x
Germany	x	x	x	x	x	x	x	x		x	x	x	x		x					x		x	x	x
Hungary	x	x	x	x	x	x	x	x		x	x	x	x	x	x		x			x		x	x	x
Luxemburg	x	x	x	x	x	x	x	x		x	x	x	x		x					x		x	x	x
Netherlands	x	x	x	x	x	x	x	x		x	x	x	x		x					x		x	x	x
Poland	x	x	x	x	x	x	x	x		x	x	x	x		x					x		x	x	x
C.C.N.R	x	x	x	x			x	x		x	x	x	x		x									
Romania	x	x	x	x	x	x	x	x		x	x	x	x	x	x		x			x		x	x	x
Serbia	x		x		x			x					x	x	x		x							
Slovakia	x	x	x	x	x	x	x	x		x	x	x	x	x	x		x			x		x	x	x
Switzerland												x					x							
Ukraine	x		x		x	x							x	x	x		x							
United Kingdom	x	x	x	x	x	x	x	x		x	x	x	x		x			x		x		x	x	x
Italy	x	x	x	x	x	x	x	x		x	x	x	x		x				x	x		x	x	x
Sweden	x	x	x	x	x	x	x	x		x	x	x	x		x					x		x	x	x
Portugal	x	x	x	x	x	x	x	x		x	x	x	x		x					x	x	x	x	x
Finland	x	x	x	x	x	x	x	x		x	x	x	x		x					x		x	x	x
Lithuania	x	x	x	x	x	x	x	x		x	x	x	x		x					x		x	x	x
Estonia	x	x	x	x	x	x	x	x		x	x	x	x		x					x		x	x	x

* Spain, Latvia, Denmark, Cyprus, Malta, Ireland and Slovenia are not included in this analysis, as these countries are generally not considered as IWT-countries.

* The United Kingdom, Italy and Portugal do not issue boatmaster certificates in line with Directives 96/50/EC and 91/672/EEC.

* Luxemburg does not issue boatmaster certificates at all.

Source: Panteia (2014)

A large distinction can be made between the Danube-countries and the other European countries on the mutual recognition of boatmaster certificates from countries outside the EU. This includes Switzerland, Ukraine, Moldavia, Serbia and Russia. By means of the Danube Convention, the boatmaster licenses of all Danube Countries plus Russia are mutually recognized by the Member States of the Danube Commission, meaning a larger workforce is available on the Danube.

The impact of mutual recognition of boatmaster certificates from EU-countries connected to the interconnected IWT network is thus most likely having an impact on the Rhine river. There, not more than 658⁴⁸ boatmasters will be added to the available workforce⁴⁹ if countries issuing licenses under Directives 96/50/EC will be mutually recognized. Another 309 boatmasters from countries not-connected to the interconnected IWT-network but issuing licenses under Directive 96/50/EC can start working on the Rhine corridor if the CCNR will mutually recognize these licenses⁵⁰.

⁴⁸ 657 boatmasters from France + 20 from Croatia - 19 French boatmasters that have a Rhine patent. Deducting this results in 658 boatmasters that may be denied access. French boatmasters are allowed on the Rhine too if they possess a Directive 96/50/EC or a Directive 91/672/EEC license and can prove at least 4 years (720 days under CCNR system instead of 400 under the French system) of navigation experience.

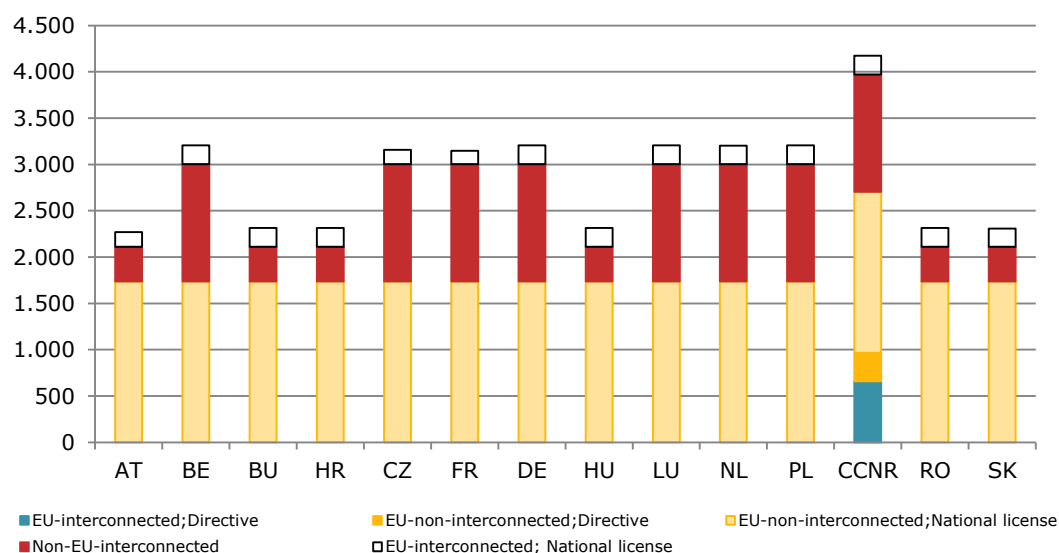
⁴⁹ Boatmasters still need to prove knowledge of specific situations on the Rhine.

⁵⁰ This involves boatmasters from Sweden, Finland, Lithuania and Estonia.



Mutually recognizing boatmaster licenses from Portugal, Italy and the United Kingdom could theoretically further increase the available workforce by 1,608 boatmasters for both CCNR-countries and Member States⁵¹. See Figure 5.13 for the amount of not-recognized boatmaster licenses per country and origin of those licenses.

Figure 5.13 Amount of not-recognized boatmaster licenses per country and origin of those licenses.



Source: Panteia (2014)

Measures aimed at operational workers

5.2.7 Measures regarding recognition of functions and qualifications

Measures include the harmonization and mutual recognition of function names and descriptions. This should lead to better mobility of operational workers in Europe. Three separate measures are comprised:

- Mutual recognition of functions and qualifications without harmonization;
- Harmonization of function names and qualifications based on EU minimum requirements. Members States can still add functions, according to their local situation.
- Mutual recognition of harmonized function descriptions and professional qualifications;

Besides, there is one measure that can be implemented independently from the other three: the introduction and mutual recognition of certificates for engineers and helmsmen at Member State level.

The following functions are comprised:

- | | |
|-------------------|------------------|
| 1. Deckhand; | 5. Able Boatman; |
| 2. Apprentice; | 6. Engineer; |
| 3. Boatman; | 7. Helmsman; |
| 4. Engine-minder; | 8. Boatmaster |

⁵¹ Practically however, in particular in Italy, this figure includes a significant number of boatmasters on ferry boats or having licence for small boats, which are excluded from the scope of the IA.



In the current situation, the partly non-harmonized function descriptions can lead to different functions (see directive 2005/36/EC) in the Member States for operational workers. Function descriptions from the following authorities have been investigated:

- The UNECE resolution;
- The CCNR Rhine personnel regulations;
- The Danube Commission;
- The Sava River Commission;
- Austria;
- Belgium;
- Germany;
- The Netherlands;
- Czech Republic;
- Poland

Function descriptions in France have been investigated too; France's local functions only include boatmaster and deckhand. Based on an analysis of the function descriptions and requirements of three river basins, six Member States and the UNECE, the following remarks can be made⁵²:

Deckhands

In all countries, no professional experience is required to become a deckhand. The minimum age for deckhands is 16 years in every country including France, with the sole exception of Austria. In this country, deckhands need to be at least 18 years old. The Sava Commission function descriptions do not include deckhands. Poland does not include deckhands either. See the Polish definition of an apprentice below.

Apprentices

The Sava Commission does not include functions for deckhands and apprentices. This makes recruitment of personnel difficult, as newcomers to the sector will not be able to contribute to the daily operation of a vessel⁵³. Other authorities agree on the function of apprentice: a person of at least 16 years of age, with an education contract of a certified IWT education school. The only exception is Poland: a Polish operational worker will be regarded apprentice if he has undergone basic training in health and safety on board, performed by the boatmaster.

Boatman

Overall, two paths leading to the function of boatman can be identified from the function descriptions and requirements.

1. Boatmen need to have completed an IWT training course and their minimum age is 17;
2. If they did not complete IWT training, the minimum age is set at 19 years and (in general) they need to prove three years of professional experience, of which at least one year in inland navigation and either two years in inland navigation or maritime. However, there are exceptions:
 - a. Germany is least strict when it comes to the recognition of professional experience of lateral entrants. If and only if the worker is aged 20 years or above, the professional experience gained is doubled. Normally, three years of professional experience, of which at least six months of professional experience in inland navigation is required. For workers aged 20 years or above, their professional experience gained is doubled. However, the doubling does not apply for the experience gained in inland navigation. Still, this is much less stringent than the other countries and river basins.

⁵² See also Annex 3, Panteia et al. (2014), Contribution to the problem definition in the context of the preparation of the Impact Assessment regarding the recognition of professional qualifications in inland navigation

⁵³ Operators that want to train deckhands and/or apprentices, will not benefit from the deckhand and/or apprentice in such a way that no other crew member can be replaced by them. Thus their daily operation will be less efficient: more costs should be spend on personnel with nothing in return. In other river basins, adding a crew member leads to longer daily operating times.



- b. In particular, the Dutch authorities are the strictest for applying for the function of Boatman. All other authorities (MS, River Commissions) ask three years (and a minimum age of 19) of professional experience⁵⁴ (with a minimum of one year in inland navigation and two years in either maritime or inland navigation) if no examination or completion of a training can be provided. The Dutch require additional examination for deckhands. However, practical examination provides a loophole for this. This way, workers only need 60 days of experience in inland navigation as a deckhand.
- c. In Poland, one will qualify for the function of Boatman after nine months⁵⁵ of experience in inland navigation and having passed a practical exam.

Engine-minders

For Engine-minders, function descriptions and requirements are harmonised within Europe. The national regulations of the Czech Republic do not include the function of engine-minders.

Able Boatman

In general, one can become Able Boatman if one has successfully completed training, the final examination of a boatmaster school or have any other examination for Able Boatman recognised by the competent authority and if at least one year of professional experience as Boatman can be proved. If the education lasted at least three years, no additional professional experience is required.

If one did not complete an IWT education course, the requirements for the function of Able Boatman are at least two years of professional experience as Boatman. The CCNR offers an alternative: one can attend a practical examination in accordance with the Rhine Licensing Regulations and once passed, the function of Able Boatman can be acquired with only one year of professional experience at Boatman.

Some derogations from the standard can however be noticed:

- The function of Able Boatman does not exist in the national regulations of Germany.
- Austria does not make a distinction between the path based on education (two years) and the path based on only professional experience. After two years as Boatman, one can apply for the function of Able Boatman.
- In Poland, one can be an Able Boatman after six months of professional experience as Boatman.

Engineer

The function descriptions and requirements for Engineers are the same throughout Europe, with a small deviation from the standard in Austria and the Czech Republic. In general, engineers need to be at least 18 years of age and need to have passed an examination or a completion of a full training course in the engine and mechanics sector, or they need to be at least 19 years of age and prove at least two years of experience as an engine-minder on a self-propelled vessel.

Some derogations to this:

- Austria and the Czech Republic do not include a minimum age for engineers that gained their function based on two years of experience as an engine-minder;

⁵⁴ Austria only requires one year of professional experience. However, as deckhands need to be at least 18 years of age (instead of 16 years elsewhere), this brings no difference at this point. The worker is only less experienced.

⁵⁵ A month is defined as a maximum of 15 days in a period of 30 days.



- In Poland, at least 20 months of professional experience in inland navigation plus a minimum 16 months of professional experience at shipyards will result in the function of engineer too, but only if the mandatory exam is passed.

Helmsman

The general requirements for the function of helmsman in Europa are at least:

1. One year of professional experience in inland navigation as Able Boatman, or;
2. Three years of experience as Boatman.

However, small deviations can be notified throughout Europe;

- On sections where KSS is required, not having KSS but having a license results in the function of helmsman (instead of boatmaster);
- The Danube Commission and the Sava Commission award the function of Helmsman after completion of vocational training of at least three years, and if practical examination approved by the competent authority is passed. This is in line with the UNECE resolution, that is applied in countries such as Ukraine and Russia.
- Germany requires two years of professional experience as Boatman of engine-minder. This seems a deviation of the standard, but it is however a result of not applying the function of Able Boatman in their national regulations. For workers that have not completed a vocational training, this approach reduces the path to the function of helmsman by one year.
- The Netherlands and Belgium do not award the function of helmsman after vocational training of at least three years of completed. However, after having passed examination, the function of helmsman will be awarded.
- In the Czech Republic, a minimum of at least two years of professional experience as Able Boatman is required.
- In Poland, one needs to prove six months of professional experience as an Able Boatman or 12 months as Boatman. For both paths, an examination of the required knowledge and practical skills is obliged.

General overview

Currently in Europe, function names and descriptions seem not to differ a lot between relevant authorities, either being countries or river commissions. France is the only exception, by only having two functions: deckhand and boatmaster. However, based on the analysis above, it can be concluded that there are many minor differences between the function descriptions and the required professional qualification. These differences may have effects on the mobility of workers.

Effects on mobility

However, some small effects on mobility can be noticed when comparing national functions with the functions on the Rhine. These have been determined by analysing the Service Record Book statistics by the national Dutch authority⁵⁶ (comprising over 30,000 SRB's). According to the Dutch authority, no other country has similar electronic databases that can be used to receive information on the differences regarding the functions in the national systems and the Rhine system.

The Dutch database comprises 26,000 national service record books and 4,000 non-national service record books. It includes identification details of the worker, such as the name, date of birth and the national identification number, as well as:

- The date when the SRB has been issued;
- The function on the national waterways of the Netherlands;
- The function on the Rhine river;

⁵⁶ The SAB is authority for both the Rhine and the Dutch national waterways.



- The date of the last change in function on national waterways;
- The date of the last change in function on the Rhine river;

The following differences in functions have been identified (see Table 5.12):

- Functions can be higher on the Rhine than in national regime:
This happens mostly when boatmasters need to obtain a SRB for providing KSS. This way, they only use the SRB for proving professional experience on the Rhine. For the navigation on national waterways, their boatmaster license provides a valid proof of professional experience.
- Functions can be lower on the Rhine than on national waters:
This happens when there are differences between granting professional experience: either for finishing IWT education or for entrants from the maritime sector.

Table 5.12 Comparison of Rhine function level with national function level for all SRB registered in the Netherlands.

Country	# SRB	Equal function on Rhine	Higher function on Rhine	Lower function on Rhine
Austria	18	94%	0%	6%
Belgium	120	81%	5%	14%
Bulgaria	17	82%	12%	6%
Croatia	8	38%	13%	50%
Czech Rep.	305	80%	8%	12%
Denmark	7	86%	0%	14%
Estonia	8	50%	25%	25%
Finland	2	100%	0%	0%
France	19	79%	0%	21%
Germany	330	88%	2%	9%
Hungary	77	78%	12%	10%
Italy	13	100%	0%	0%
Latvia	28	100%	0%	0%
Lithuania	12	92%	8%	0%
Luxembourg	1	100%	0%	0%
Netherlands	26,261	84%	2%	14%
Poland	588	76%	9%	15%
Portugal	180	87%	1%	13%
Slovakia	264	78%	8%	15%
Romania	396	77%	8%	15%
Slovenia	7	86%	0%	14%
Spain	42	88%	2%	10%
Sweden	7	86%	14%	0%
Switzerland	33	91%	0%	9%
United King.	71	83%	1%	15%
Other	1,589	75%	3%	22%
countries				
Total	30,007	83%	2%	15%

Source: Panteia 2014, based on data from Stichting [Afvalstoffen] & Vaardocumenten Binnenvaart (SAB)

It must be noted from Table 5.12 that most national functions equal the Rhine function. However, in 15% of the cases, the function on the Rhine is lower than the national function. This equals 4,375 persons, of whom 50% holds the national function of apprentice. The reason for these people to loose ratings is due to the fact their certificates or examinations are not recognized by the CCNR. Other reasons include



differences in granting professional experience after completing a training course⁵⁷ and the different approaches with regards to functions acquired only by obtaining professional experience and not having completed an IWT education course. See Table 5.13 for the comparison between functions on the Rhine and in the Netherlands.

Table 5.13 Comparison of Rhine function with national function for all functions in the Netherlands (2014) for all nationalities.

	Function on the Rhine					Total
	<i>Helmsman</i>	<i>Able Boatman</i>	<i>Boatman</i>	<i>Apprentice</i>	<i>Deckhand</i>	
National function						
Helmsman	0	727	452	24	191	1,394
Able Boatman	0	0	706	3	27	736
Boatman	0	0	0	8	40	48
Apprentice	0	0	0	0	2,197	2,197
Deckhand	0	0	0	0	0	0
Total	0	727	1,158	35	2,455	4,375

Source: Panteia 2014, based on data from SAB (2014)

It must be noted that the majority of people losing ratings on the Rhine when compared to the Dutch regulations on professional experience, are apprentices having a function as deckhand on the Rhine. This should not be possible according to the current regulations of the CCNR and the Dutch authorities with regards to apprentices. However, detailed analysis on this group proved that the majority (>99%) of the SRB involved were requested before 2001; the year in which the current Service Record Books were introduced.

Workers having a national function of helmsmen and a Rhine function of deckhand (n=191), are all originating from the Netherlands. The reason for this large group to show such a difference between the national function and the function on the Rhine is due to the fact that the CCNR recognizes professional experience acquired on other waterways than the Rhine since 1998. Apparently, all these persons were operating in the domestic transport and they never gained experience on the Rhine. As they have never had their SRB checked since 1998, they still have no function on the Rhine.

Table 5.13 indicates many helmsman on national waterways downgraded to the function of able boatman. This is due to differences in the Dutch regulations and the Rhine regulations. The Dutch regulations require four years of professional experience for boatmasters. A maximum of three years can be deducted if IWT education and/or practical examination is passed successfully. Opposingly, the Rhine regulations indicate an additional two years of professional experience in the function of able boatman. Graduates from IWT education of course do not have this experience directly upon graduating.

Another large group of downgraded workers consists of Able Boatmen being downgraded to boatmen. The Dutch regulations do not make difference between experience gained with a diploma (education path) or without (experience based path). However, Rhine regulations do make this difference and for workers that choose to qualify themselves via the experience based path, one extra year in the function of boatman is required before promotion to Able Boatman is possible.

⁵⁷ CCNR awards the function of Able Boatman after successfully finishing an educational program of three years in inland navigation, whilst the Dutch authorities award the function of helmsman.



Other reasons for downgrading of workers is the fact that professional experience obtained by IWT education is not always (completely) recognized by CCNR-regulations. This is most likely the case for non-CCNR workers. Analysing Table 5.13 and the national functions of workers from non-CCNR countries (but connected to the European Inland Waterway Network) as presented in Table 5.14, it can be concluded that 90% of the Boatman that are downgraded to Deckhand, originate from Non-CCNR countries. In total, 20% of the non-CCNR boatman lose their functions as their certificates and diplomas are not recognised by the CCNR, opposed to 0.6% for CCNR-workers. This mainly involves workers from Poland and Romania. For the downgrading from helmsman to Able Boatman or Boatman, no significant differences could be found with CCNR-workers.

Table 5.14 Comparison of Rhine function with national function for all functions in the Netherlands (2014) for non-CCNR workers.

		<i>Function on the Rhine</i>					
		<i>Helmsman</i>	<i>Able Boatman</i>	<i>Boatman</i>	<i>Apprentice</i>	<i>Deckhand</i>	<i>Total</i>
National function	Helmsman	0	66	28	0	1	95
	Able Boatman	0	0	26	1	5	32
	Boatman	0	0	0	3	27	30
	Apprentice	0	0	0	0	57	57
	Deckhand	0	0	0	0	0	0
Total		0	66	54	4	90	214

Source: Panteia 2014, based on data from SAB (2014)

These analyses show that labour mobility barriers for operational workers due to different regimes with regards to the recognition of professional experience and qualifications are still existent within Europe. About 1,987⁵⁸ operational workers have lower functions on the Rhine than their country of origin, equalling 6.6% of the current Service Record Books in the Netherlands. As the data of the Netherlands is representative for the EU IWT labour market as a whole, we have taken 6.6% as a proxy for all operational workers in Europe.

Monetizing effects of harmonisation with the model

On a yearly basis, 6.6% of the operational workers are affected by different regimes with regards to professional experience and qualifications. This results in a lower function on the Rhine for these workers and thus a lower salary. The model on operational workers provides information on the amount of operational workers working on the Rhine corridor, and can thus be used to provide evidence on the damage to society caused by these mobility barriers that originate from different regimes with regards to the recognition of professional experience and qualifications.

Methodology

In order to determine the effects of the measures regarding recognition of functions and qualifications on mobility, the following approach is used:

1. Based upon Table 5.13, the amount of workers whose functions are affected by differences in national regimes and river basin regimes regarding professional experience are determined by using the percentage mentioned on the previous page (6.6%) and the labour demand/supply model for operational workers;
2. Based upon this proportion, the amount of workers that drop from a certain level (i.e. helmsman) to another lower level (i.e. able boatman) can be determined for all years.

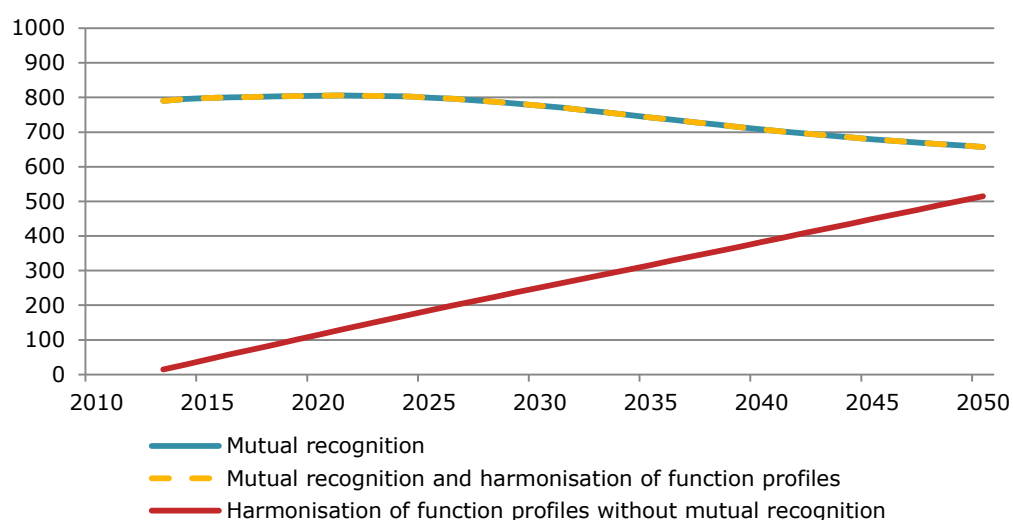
⁵⁸ 4,375 – 2,197-191 = 1,987



Results

Assuming the aforementioned 6.6% will remain constant over time, it can be determined that 796 people are affected in 2014. In 2030, this figure is 777 and in 2050, 657 operational workers are affected. Figure 5.14 shows the evaluation of the amount of workers affected over time. The scenario without mutual recognition of function names, but with harmonising, shows a gradual increase to 515 workers in 2050. This is equal to the aggregated amount of new entrants willing to work on the Rhine corridor per year, up to 2050.

Figure 5.14 Amount of operational workers affected per year by the different regimes with regards to the recognition of professional experience and qualifications



Source: Panteia (2014)

The labour demand/supply model subset for operational workers provides information on the breakdown of workers per nationality per year as well. This information can be used in order to estimate economic effects of the different regimes for the recognition of professional experience and qualifications. As the workers affected have a lower qualification on the Rhine than elsewhere, they receive less salary. See Table 5.15 for the annual missed earnings per function-relation.

Table 5.15 Comparison of Rhine function with international function for all functions (2014).

		Function on the Rhine				
		<i>Helmsman</i>	<i>Able Boatman</i>	<i>Boatman</i>	<i>Apprentice</i>	<i>Deckhand</i>
National function	Helmsman	-	-€ 752	-€ 1,336	- €7,039	-
	Able Boatman	-	-	-€ 583.23	- € 6,287	- € 6,287
	Boatman	-	-	-	- € 5,703	- € 5,703
	Apprentice	-	-	-	-	-
	Deckhand	-	-	-	-	-

Source: CAO Loontabel Binnenvaart 2014

Further, information is used in order to compare wages of workers from the Netherlands with workers from other countries. The price index figures for the wage of workers in Inland Navigation is presented in Table 5.16.



Table 5.16 Price Index Figures for the wage of workers in Inland Navigation⁵⁹

Country	Wage Factor	Country	Wage Factor
Austria	176%	Netherlands	100%
Belgium	145%	Poland	31%
Bulgaria	14%	Romania	23%
Germany	97%	Slovakia	34%
France	134%	Switzerland	160%
Hungary	33%	Czech Republic	32%
<i>For other countries, a factor of 100% has been used.</i>			

Source: CAO Loontabel Binnenvaart 2014

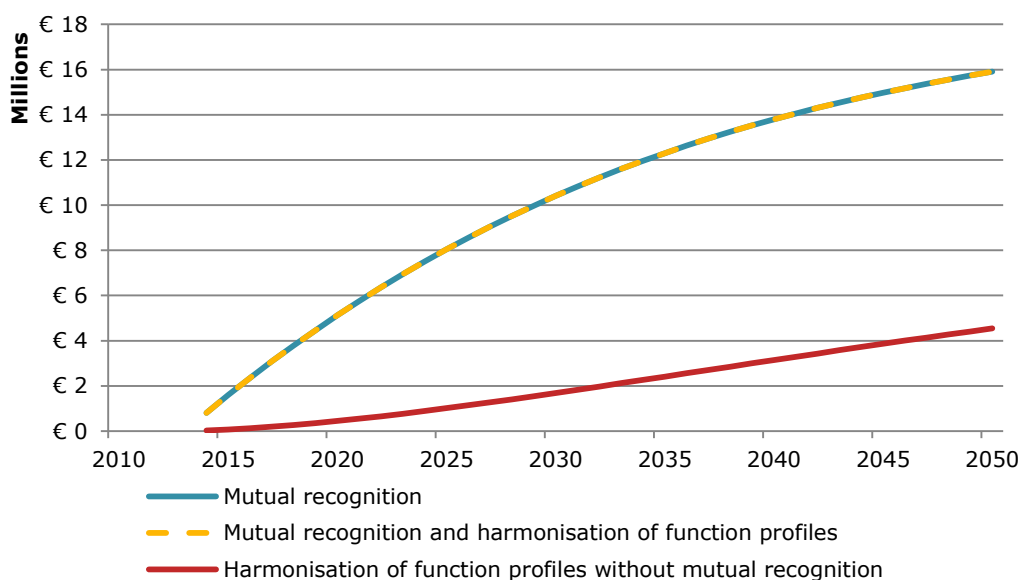
Net Present Value

In order to determine the effects of the measures regarding recognition of functions and qualifications on mobility, the following approach is used:

- Based upon the number of workers affected, as calculated previously (Table 5.13) and the wage differences and factors mentioned in Tables 5.16 and 5.17, the annual economic effects of the measures can be calculated.

The Net Present Value of the measures on harmonisation of function profiles and requirements is presented in Figure 5.15. The Net Present Value adds up to € 10,411,731 (€ 11,436,189 with non-EU countries included) in 2030 and € 15,908,025 (€ 17,204,164) in 2050 for the measures in which mutual recognition is involved. For the scenario with only harmonisation of function profiles, the Net Present Values develops in a different manner: as the effect grows per year, the Net Present Value shows an increasing trend within the period of scope. It adds up to € 1,686,012 (€ 1,840,565) in 2030 and € 4,544,145 (€ 4,833,206) in 2050.

Figure 5.15 Net Present Value of the measures on mutual recognition of functions and qualifications



Source: Panteia (2014)

⁵⁹ These factors have been determined by analysing the Eurostat tables on Industry, trade and services (sbs_na_serv) for inland water freight and passenger transport, on the indicators personnel costs (V13310) and the number of employees in full time equivalent units (V16140). Comparing these numbers for the countries involved has resulted in this Table.



5.2.8 Certificates for helmsmen and engineers

Table 5.17 shows the amount of helmsmen and engineers that have a lower function on the Rhine than on the Dutch national waters⁶⁰. These workers are affected by the different regimes with regards to the recognition of professional experience and qualifications. The mobility barriers that affect these workers can be abrogated by introducing a certificate for helmsmen and engineers on Member State level. In the following analysis, these figures have been extrapolated to EU level.

Table 5.17 Comparison of Rhine function levels with national function levels in the Netherlands for helmsmen and engineers (2014).

		Function on the Rhine					Total
		<i>Helmsman</i>	<i>Able Boatman</i>	<i>Boatman*</i>	<i>Apprentice</i>	<i>Deckhand</i>	
NE	Helmsman	0	727	452	24	191	1,394
	Engineer	0	0	23	0	21	43

Source: Panteia 2014, based on data from SAB (2014)

The model on operational workers provides information on the breakdown of workers per nationality and per year. This information can be used in order to estimate the economic effects of the different regimes with regards to the recognition of professional experience and qualifications. As the workers affected have a lower qualification on the Rhine than elsewhere, they receive less salary. See Table 5.18 for the annual missed earnings per function-relation.

Table 5.18 Annually missed earnings per function-relation

		Function on the Rhine					
		<i>Helmsman</i>	<i>Able Boatman</i>	<i>Boatman*</i>	<i>Apprentice</i>	<i>Deckhand</i>	
NE	Helmsman	-	-€ 752	-€ 1,336	-€7,039	-	
	Engineer	-	-	-€ 8,915	-	- € 15,013	

Source: CAO Loontabel Binnenvaart 2014

To compare wages of workers from the Netherlands with workers from other countries, the Price Index Figures for the wage of workers in Inland Navigation was used (see Table 5.16).

Net Present Value

In order to determine the effects of the measures regarding recognition of functions and qualifications on mobility, the following approach is used:

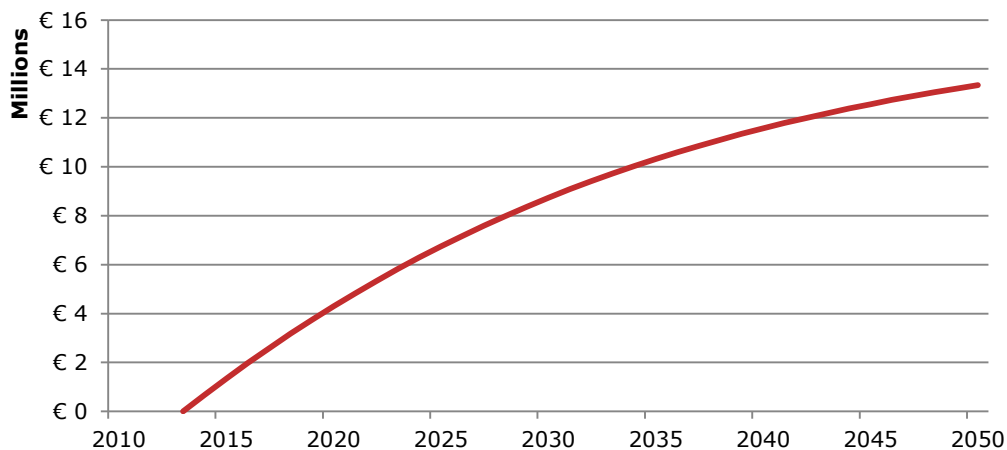
1. Based upon Table 5.17, the amount of helmsmen and engineers whose functions are affected by differences in national regimes and river basin regimes regarding professional experience are determined by calculating the proportion of helmsmen and engineers affected and using the labour demand/supply model for operational workers;
2. Based upon these proportions, the amount of helmsmen and engineers that drop from a certain level (i.e. helmsman) to another lower level (i.e. Able Boatman) can be determined for all years;
3. Based upon the number of helmsmen and engineers affected as calculated previously (Table 5.17) and the wage differences and factors mentioned in Tables 5.16 and 5.18, the annual economic effects of the measures can be calculated.

⁶⁰ According to SAB, no data is available for other countries.



The Net Present Value of the certificate for helmsmen and engineers on Member States level is presented in Figure 5.16. The Net Present Value adds up to € 8,732,356 (€ 9,519,572 in case non-EU countries are included) in 2030 and € 13,342,116 (€ 14,429,193) in 2050.

Figure 5.16 Net Present Value of the certificate for helmsmen and engineers on Member States level



Source: Panteia (2014)

5.3 Safety

5.3.1 Certificates for vessels between 20 and 40 metres

This measure may have a limited negative impact on safety. Inexperienced boatmasters can start sailing one year earlier, which has negative impacts on safety as they are slightly more accident prone. However, the impact of accidents of vessels between 20 and 40 metres is on average less than the impact of accidents with larger vessels, due to the larger mass of the latter ones. Thus, although the probability of an accident to occur increases, the average impact of an accident decreases. It is assumed that these effects more or less balance each other.

5.3.2 Certificates for large convoys

For this measure, it is difficult to quantify the safety effects, as no data is available on the number of accidents in which large convoys are involved. Figure 5.17 shows that the amount of navigation related accidents avoided can be rather small in order to make this measure still cost-effective.

Methodology

In order to determine the break-even point (how much accidents should be prevented by the measure in order to be cost-effective), the following has been calculated:

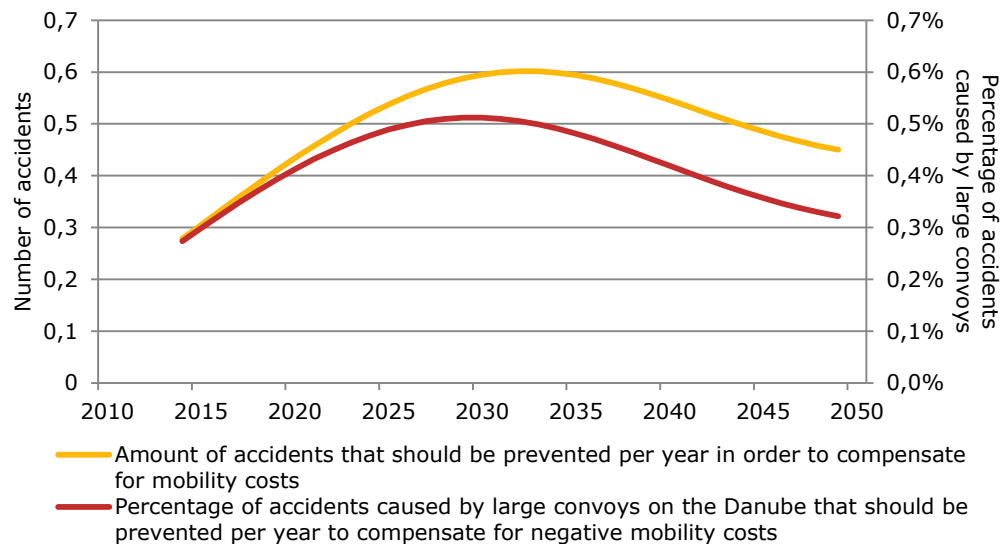
1. The effects of the measure on mobility, as calculated in section 5.2.2, are divided by the costs of an navigation-related accident (€ 40,357)⁶¹.
2. This way, the break-even point can be found: how much accidents should be prevented per year by the measure in order to be cost-effective.

⁶¹ Panteia et al. (2014), Contribution to the problem definition in the context of the preparation of the Impact Assessment regarding the recognition of professional qualifications in inland navigation



3. The transport performance of these convoys can be calculated, taking into consideration the development of the fleet (from 67 pushers in 2014 to 93 in 2050), an average payload of 10,000 tonnes per convoy, an average transport distance of 1,500 kilometres and 15 journeys per convoy per year.
4. The amount of accidents caused by these convoys can be calculated by multiplying the transport performance by € 0.0003 and dividing this number by € 40,357.

Figure 5.17: Amount of accidents that should be prevented per year in order to compensate the negative economic effects of the measure.



Source: Panteia

In order to compensate for the negative economic effects of this measure, as much as 0.028 accidents per year should be prevented by the measure for 2014. This value tops at 0.6 accident prevented in 2033. Based on these calculations, as much as 0.28% of the accidents caused by large convoys should be prevented in 2014 to compensate for the negative mobility costs. This percentage is the highest at 2030: 0.51% of the accidents shall be prevented to compensate for the mobility costs.

5.3.3 No derogation of member states to minimum age for issuing boatmaster licenses

In order to calculate the effects of the measure on safety, the following approach has been used.

Methodology

In order to determine the safety effects of the measures regarding the professional experience, the following approach is used:

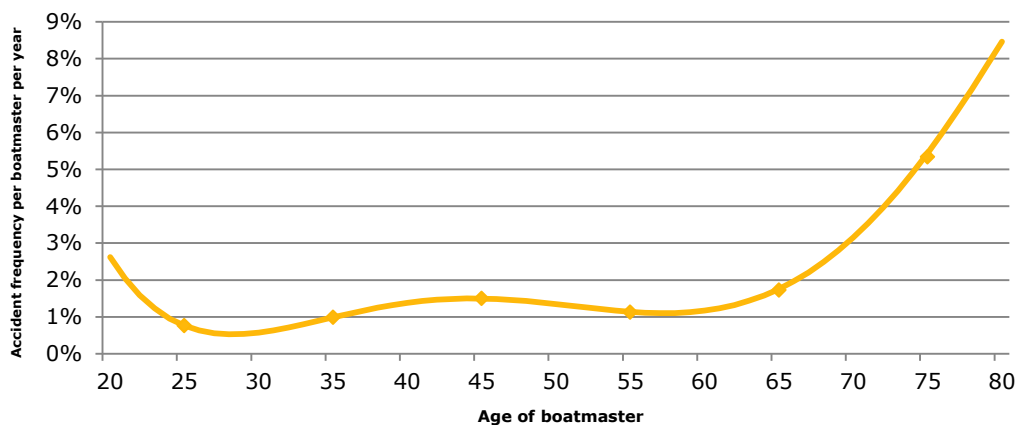
1. Based upon the new inflow, the regulations and the contents of the measure, age distributions have been created for the measures and the BAU scenario. It has been assumed that boatmasters can start operating in the countries involved (Belgium, France and the Netherlands) at the age of 20;
2. Based upon the accident frequencies of boatmasters depending on age (see Figure 5.18)⁶², the amount of accidents can be determined for the measure and BAU.

⁶² This is the result of extrapolating the data



3. Both the measure and the BAU show gaps on the demand/supply. However, in IWT all boatmaster jobs are filled; if there is a lack of supply, elderly people from the hidden reserve will be deployed.
4. The amount of people deployed from hidden reserve may not be higher than the total amount of people in the hidden reserve;
5. The amount of people deployed from the hidden reserve are proportionally allocated over the age categories of the hidden reserve, taken into account absolute retirement based upon the figures in § 5.3.5.
6. The amount of tonne kilometres per boatmaster increases steadily, based upon NEA et al. (2011). This is seen as a multiplication of the accident frequency.
7. By comparing the accident numbers per year for both the BAU scenario and the measure, the effects on safety can be determined in terms of accidents saved per year. This can be monetized by multiplying these by the average external costs of an IWT navigation related accident (€ 40,357).

Figure 5.17 Relation between the accident frequency per boatmaster per year and a boatmaster's age

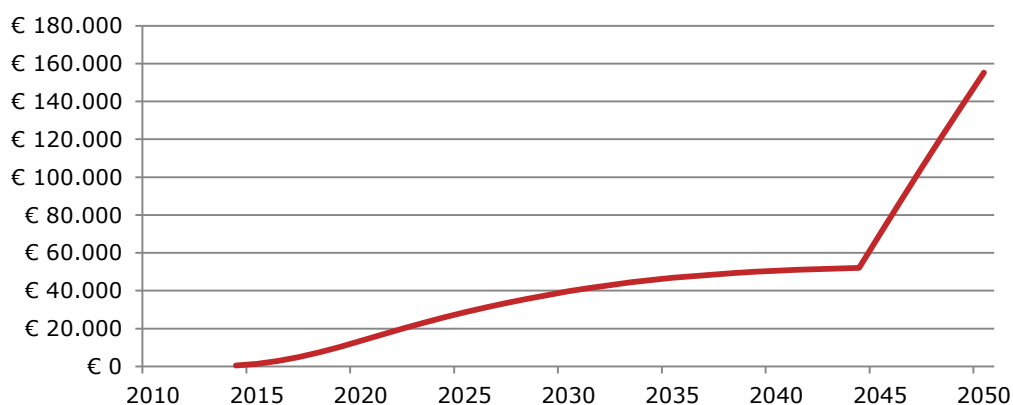


Source: Panteia (2014), based upon ILT (2013)

Results

The results of this analysis are presented in Figure 5.19.

Figure 5.18 Net Present Value of the measure



Source: Panteia (2014)



The Net Present Value of this measure counts up to € 39,694 in 2030 and € 155,308 in 2050.

Interpretation of results

Some remarks can be made on the graph in Figure 5.19:

- Discontinuities at around 2044;
This is the result of the a large labour shortage at time: even the hidden reserve is not able to bridge the gap between demand and supply. Thus, not allowing member states to derogate from the minimum age in Directive 96/50/EC will help reducing the number of accidents per year, as the more accident-prone boatmasters of 20-year olds will not be permitted to navigate in the Netherlands, Belgium and France anymore. In the years before, the 20-year olds were substituted by people from the hidden reserve. It can be observed from Figure 5.18 that most of them have an accident frequency that is comparable to the 20-year olds.

5.3.4 Measures regarding the frequency of medical check-ups.

Here, three (mutually exclusive) scenarios are considered, and compared to BAU:

- The 96/50/EC Directive: medical check-up every year after 65
- The CCNR-standards for medical check-ups: every 5 years between 50-65, yearly after 65;
- The Dutch proposal, which compromises medical checks at 60, 65 and 70 and hereafter once every two years;

The Dutch proposal is an initiative of the Dutch Ministry of Infrastructure and the Environment⁶³. Based on accident statistics, they have concluded that elder boatmasters are not more accident prone than younger boatmasters. In absolute terms, this is true. However, when compared to the age distributions of workers in the Netherlands, different conclusions can be drawn⁶⁴. See Table 5.19.

Table 5.19: Amount of accidents per age group in the Netherlands.

Age group	Amount of workers in age category	2008	2009	2010	2011	2012	Total
< 21	750	4	1	0	2	1	8
21 - 30	2,230	26	20	13	14	12	85
31 - 40	2,863	30	29	32	32	18	141
41 - 50	2,907	50	41	55	42	29	217
51 - 60	3,374	36	34	47	45	28	190
61 - 70	1,711	29	24	40	35	19	147
71 - 80	75	3	0	4	9	4	20
Total	13,910	178	150	191	180	111	810

Source: Analyse leeftijdsgeboden keuringen beroepsmatige binnenvaart, ILT (2013)

Dividing the accident numbers by the amount of workers in the age group, the accident frequency per worker per year can be determined. This sheds a different light on this topic. As can be observed from Table 5.20, the accident frequency is gently rising over time.

⁶³ Analyse leeftijdsgebonden medische keuringen beroepsmatige binnenvaart (1 August 2013), Inspectie Leefomgeving en Transport, Ministerie van Infrastructuur en Milieu

⁶⁴ These conclusions have been discussed with: Mr. T.C.P.M. Mutsaerts, Medical Advisor Shipping, Inspectie Leefomgeving en Transport, Ministerie van Infrastructuur en Milieu, author of the report 'Analyse leeftijdsgebonden medische keuringen beroepsmatige binnenvaart'



Table 5.20: Accident frequency per boatmaster per year per age group.

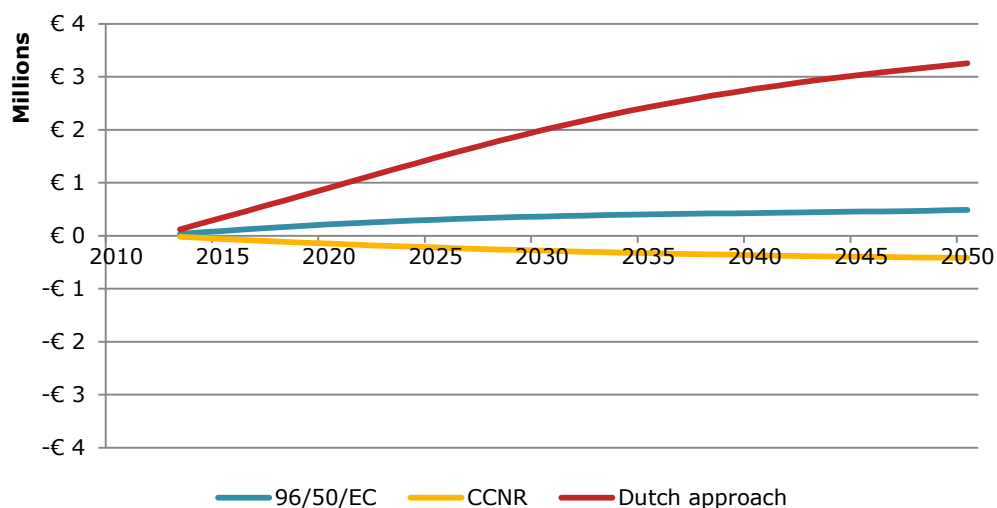
Age group	2008	2009	2010	2011	2012	Average
< 21	0.5%	0.1%	0.0%	0.3%	0.1%	0.2%
21 - 30	1.2%	0.9%	0.6%	0.6%	0.5%	0.8%
31 - 40	1.0%	1.0%	1.1%	1.1%	0.6%	1.0%
41 - 50	1.7%	1.4%	1.9%	1.4%	1.0%	1.5%
51 - 60	1.1%	1.0%	1.4%	1.3%	0.8%	1.1%
61 - 70	1.7%	1.4%	2.3%	2.0%	1.1%	1.7%
71 - 80	4.0%	0.0%	5.3%	12.0%	5.3%	5.3%

Source: Analyse leeftijdsgeboden keuringen beroepsmatige binnenvaart, ILT (2013), Panteia (2013)

The content of this table is also shown as graph in Figure 5.18 that describes the relation between the accident frequency per boatmaster per year.

Accident frequencies for IWT transport are applied in order to estimate the effects on safety. Using the country-specific developments in age distribution (see Problem Analysis study⁶⁵), the number of medical examinations is calculated for the various policy measures. This model is based on information from questionnaires from the Evaluation study⁶⁶ and from Ecorys (2013) and additional modifications by Panteia in order to smoothen the aggregated age numbers. The model also includes the hidden reserve (retired workers from 65 to 80 years old) and it assumes a general estimation of the amount of retirements for self-employed boatmasters. This way, the safety effect of medical checks can be evaluated. See Figure 5.20 for the Net Present Value of the difference in accidents between the BAU scenario and the three measures that were investigated.

Figure 5.20: Net Present Value of the amount of extra accidents compared to the BAU scenario.



Source: Panteia (2014)

⁶⁵ Panteia et al. (2014), Contribution to the problem definition in the context of the preparation of the Impact Assessment regarding the recognition of professional qualifications in inland navigation

⁶⁶ Evaluation of the framework of relevant directives related to the initiative on recognition and modernisation of professional qualifications in inland navigation, 2013, Panteia et al.



From Figure 5.20 the following can be concluded:

- The current CCNR-standards score highest with regards to safety benefits. In fact, it is the only measure that actually diminishes the amount of accidents. About 0.5 accident per year will be prevented.
- The least strict policy approach is the Dutch proposal. It leads to extra accidents per year, estimated as around three to five per year. Based upon the evaluation of tonne kilometers⁶⁷, the accident numbers in IWT are expected to increase from 1,151 accidents in 2013 to 2,019 accidents in 2050.
- In 2030, the savings of € 281,249 can be realized adopting the CCNR-approach. Extra costs for navigation-related accidents should be taken into account when the 96/50/EC approach is maintained (€ -362,442 / € -388,946 *in case accidents by non-EU countries are taken into account*) or the Dutch proposal (€ -1,989,717 / € -2,083,890) is adopted.
- In 2050, the savings of € 417,426 can be realized adopting the CCNR-approach. Extra costs for navigation-related accidents should be taken into account when the 96/50/EC approach is maintained (€ -485,051 / € -520,493) or the Dutch proposal (€ -3,252,730 / € -3,403,496) is adopted.

5.3.5 Measures regarding minimum professional experience

Three (mutually exclusive) measures are compared to the BAU scenario:

- The Directive 96/50/EC for the whole of Europe, without exemption on the Rhine; 4 years of experience, but experience, training (three years) or passing a practical exam may bring this down to 1 year. The path only based on experience will take four years.
- The Rhine approach for the whole of Europe: 4 years of experience, but experience or training (three years) may bring this down to 2 years⁶⁸. The experienced based path will take at least five years, as it requires three years of experience to become boatman from the position of deckhand and the CCNR requires at least two years as a boatman to become a boatmaster.
- A competence-based approach to assess the professional experience demonstrated a minimum of one year of navigation service and competence proved by either professional training certified by a school diploma or the successful passing of an administrative exam (which may include practical examination or a simulator examination)

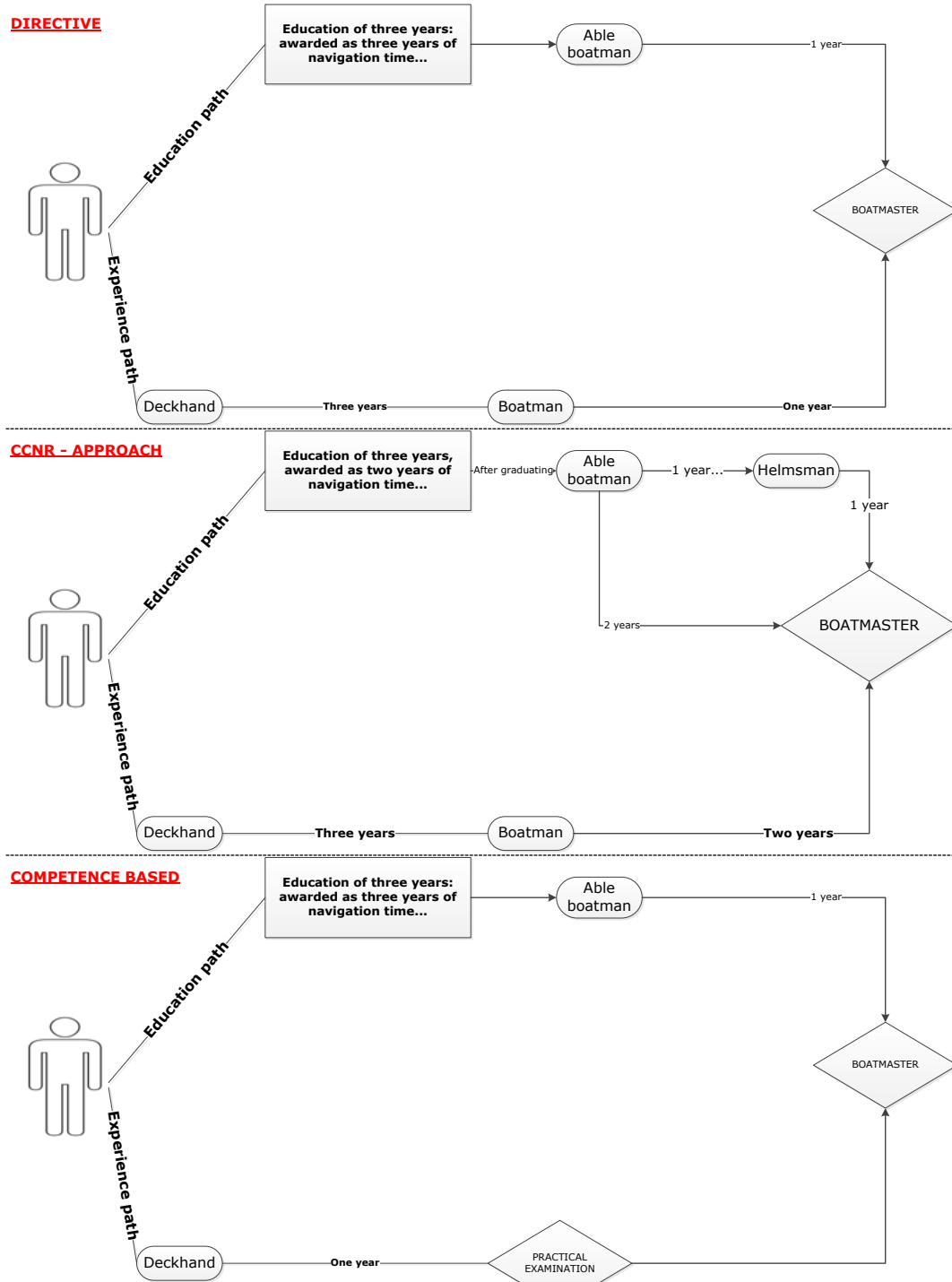
The three measures comprise both two different paths (education based or experience based) to the boatmaster license, taking either four or five years, depending on the chosen path and measure. An overview of the three different paths, together with time spent and navigation time awarded is presented in Figure 5.21 for the three measures and two paths.

⁶⁷ NEA et. al, 2011: Medium and long term perspectives of Inland Waterway Transport in the European Union

⁶⁸ Dienstinstructies voor bevoegde autoriteiten overeenkomstig artikel 1.03 van het RSP. Annex 1 to instruction no. 1.



Figure 5.20 Paths to boatmaster per scenario



Source: Panteia (2014)

The measures regarding minimum professional experience have an effect on safety in three different ways.

- An alignment to CCNR-standards will lengthen the path from deckhand to boatmaster for boatmasters that did not pass a practical examination or graduated from an IWT



- education training institute to five years, as compared to four years for the EU Directive 96/50/EC. As these boatmasters (approximately 15% of the education volume per year) have not attended professional education, they will have higher accident risks.
- An alignment to CCNR-standards would set the minimum age to become a boatmaster to 22 years, as the professional training is only awarded as two years of professional experience instead of three, and thus two additional years are needed.
 - However, as the labour market for boatmasters has got shortages on all corridors, this will imply that retired boatmasters should be deployed. As these boatmasters are more prone to accidents (see Figure 5.18), this may result in a trade-off effect. This trade-off effect is most likely to happen when the CCNR-standards are applied, as this approach turned out to be the least effective in terms of labour mobility (see § 5.2.5).

Methodology

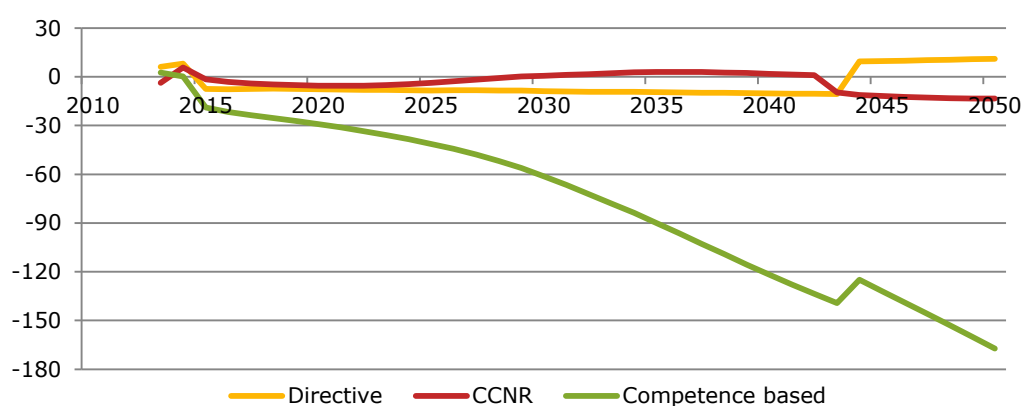
In order to determine the safety effects of the measures regarding the professional experience, the following approach is used:

1. Based upon the new inflow, the regulations and the contents of the measures, age distributions have been created for each of the measures and the BAU scenario;
2. Based upon the accident frequencies of boatmasters depending on age (see Figure 5.18), the amount of accidents can be determined for every measure.
3. All three scenarios show gaps on the demand/supply, as presented in § 5.2.6. However, in IWT all boatmaster jobs are fulfilled; if there is a lack of supply, elderly people from the hidden reserve will be deployed.
4. The amount of people deployed from hidden reserve may not be higher than the total amount of people in the hidden reserve;
5. The amount of people deployed from the hidden reserve are proportionally divided among the age categories of the hidden reserve, taken into account absolute retirement based upon the figures in § 5.3.5.
6. The amount of tonne kilometres per boatmaster increases steadily, based upon NEA et al. (2011). This is seen as a multiplication of the accident frequency per boatmaster.
7. By comparing the accident numbers per year for both the BAU scenario and the measures, the effects on safety can be determined in terms of accidents saved per year.

Results

The results of this analysis are presented in Figure 5.22.

Figure 5.21 Difference in the amount of accidents per year compared to the BAU scenario



Source: Panteia (2014)



Interpretation of results

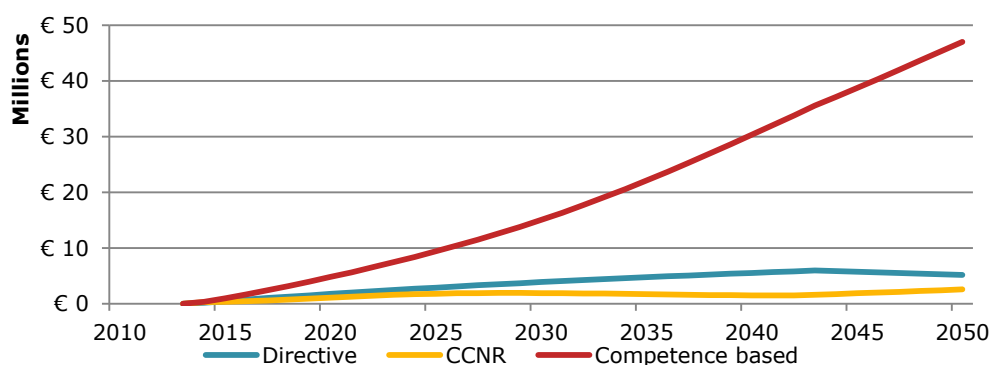
Some remarks can be made about the graph in Figure 5.22:

- Discontinuities at around 2045;
This is the result of a large labour shortage at that time: even the hidden reserve is not able to bridge the gap between demand and supply. All scenarios, including the baseline scenario, completely exhaust the hidden reserve workforce.
- CCNR being the most unsafe scenario within the period 2027 – 2044;
The CCNR-policy on professional experience is the most stringent of the three measures investigated: boatmasters can start operating (mainly) at the age of 22. This is the result of the CCNR awarding only two years of professional experience, instead of three. This way, the education based path takes just as long as the experienced based path. This implies that the CCNR should be the safest measure at all time, but this proves wrong. Within the period 2027 – 2044, the hidden reserve is not exhausted for all scenarios. But as the CCNR is the most stringent scenario in terms of minimum age, the regular workforce (21-65) is the smallest of all measures evaluated. This results in the largest share of elderly people from the hidden reserve, which are more accident-prone having a negative impact on safety. For a while, the CCNR-approach is even more unsafe than BAU.
- Competence based approach performs much better in terms of safety;
The competence based approach performs much better than the other two scenarios as it includes practical examination of the skills before being able to become a boatmaster. In the other scenarios, one can become a boatmaster without a proof of competences. Four years of professional experience does not guarantee the development of any knowledge and skills: i.e. the "potato peeler syndrome".⁶⁹ However, after only four years of experience (five in case of the CCNR-standards), one can obtain the boatmaster license. This way, workers that have never been at the helm of the ship can still obtain the license. By acquiring practical examination, the competences of every candidate are proved. This results in a yearly increasing safety effect as every year the people entering the sector via the experience path will benefit from the measure. This way, the competence based approach performs much better than applying either the current EU standards or the CCNR policy.

Monetizing effects

The monetization of the effects of the measures compared to BAU are presented in Figure 5.23.

Figure 5.22 Net Present Value of savings on accidents per measure compared to the baseline scenario



Source: Panteia (2014)

⁶⁹ The potato peeler syndrome is meant to describe the situation where a person is on board a ship and is fully occupied with peeling potatoes and consequently does not acquire new knowledge and skills.



All measures will have a positive effect on safety, in terms of Net Present Value. However, it must be noted that the measures based on the current EU-Directive will give steady results until 2044. Starting from that moment, the Net Present Value is drops since the measure results in more accidents compared to the Baseline scenario. The Net Present Value of the CCNR-standards shows an increase after since 2044. The NPVs for 2030 and 2050 are presented in Table 5.21.

Table 5.21 Net Present Value of measures regarding minimum professional experience

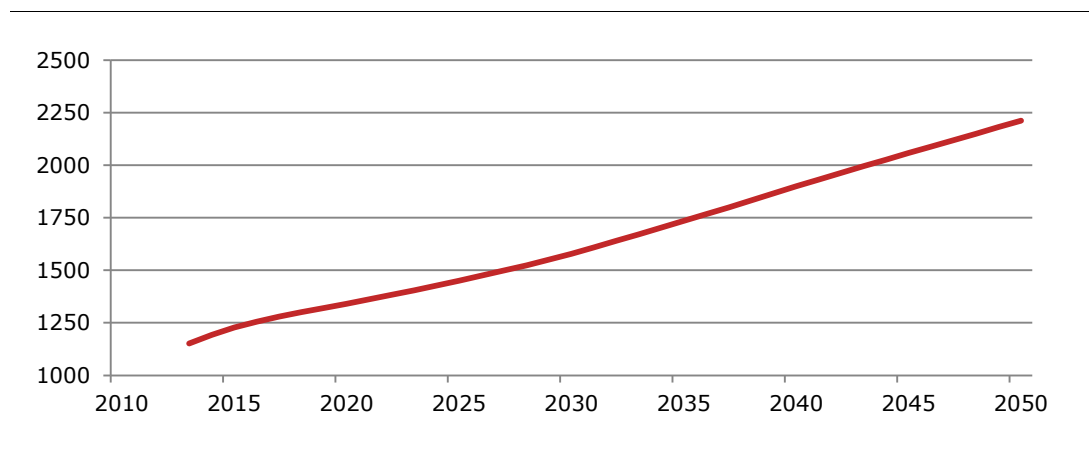
Total	2030	2050
Directive	€ 3,859,382	€ 5,141,685
CCNR	€ 1,884,561	€ 2,533,778
Competence-based approach	€ 15,017,227	€ 46,960,033

Source: Panteia (2014)

5.3.6 Measures regarding recognition of certificates

The amount of accidents in the BAU scenario increases from 1,193 accidents in 2014 up to 1,579 accidents in 2030 and 2,212 accidents in 2050. See Figure 5.24 for the development of the accident numbers on the European interconnected IWT network.

Figure 5.24 Development of the amount of accidents per year in the BAU scenario (2013-2050)



Source: Panteia (2014), based upon the Problem Definition (Panteia, 2014) and NEA et al. (2011)

One major reason behind the increase of accidents, besides of the increased transport demand, is the amount of elderly people navigating in order to bridge the gaps between labour demand and supply. In this section, the following two proposals of the European Commission that concern the recognition of boatmaster certificates will be evaluated.

The proposals compromise:

- Mutual Recognition of all boatmaster certificates;
In this proposal, all boatmaster licenses will be mutually recognized and thus, less hidden reserve workers will have to be deployed as boatmaster, as they can now be replaced by workers that were first were subjected to labour mobility barriers. In this proposal, educational programs and exams are not completely aligned, which means that differences in accident frequencies between CCNR-workers and non-CCNR workers remain.
- Harmonised requirements for a EU boatmaster certificate.
In this proposal, the amount of people subjected to labour mobility barriers decreases slowly over time. Only new boatmasters having passed an accredited exam will be able to get an EU



boatmaster license, which will also be valid on the Rhine river once KSS is proved. It can be noted that it will not only concern new entrants but also boatmasters who will ask for KSS⁷⁰.

Only the measure that involves harmonised requirements for a EU boatmaster certificate will have a positive effect on safety. In case of only mutual recognition the amount of accidents on the European Inland Waterway Network stays more or less the same. This is due to the fact that a lot of retired, more accident-prone boatmasters, are navigating (see Figure 5.19). If we apply mutual recognition, these people from the hidden reserve do not need to be deployed, but they will be replaced by boatmasters from Non-CCNR countries that have graduated from IWT schools that have not kept up with technological standards. In general, their accident frequencies are a factor 1.84 higher: 9.54 for boatmasters from Non-CCNR countries versus 5.18 for boatmasters from CCNR countries⁷¹. This leads to the following approach to determine the safety effects of the measures comprised:

Methodology

In order to determine the safety effects of the measures regarding the recognition of certificates, the following approach is used:

1. Based upon the new inflow, the regulations (CCNR regulations and EU Directive regulations) and the contents of the measures, age distributions have been created for the measures and the BAU scenario;
2. Based upon the accident frequencies of boatmasters depending on age (see Figure 5.17), the amount of accidents can be determined for every measure. The accident frequencies are split into two separate frequencies, being equal to the accident frequencies for CCNR-boatmasters and Non-CCNR boatmasters: 9.54 for boatmasters from Non-CCNR countries versus 5.18 for boatmasters from CCNR countries⁷².
3. All three scenarios show gaps in the labour demand/supply model, as presented in § 5.2.6. However, in IWT all boatmaster jobs are filled; if there is a lack of supply, hidden reserve workers will be deployed.
4. The amount of hidden reserve workers deployed may not be higher than the total amount of hidden reserve workers;
5. The hidden reserve workers are proportionally allocated over the age categories of the hidden reserve, taking into account the age at which it is assumed that workers from the hidden reserve stop being available on incidental basis. These figures are based on those presented in section § 5.3.5.
6. As the amount of tonne kilometres per boatmaster increases steadily over time, the risks of boatmasters being involved in an accident will increase too. In order to model this effect, compensation factors are applied that relate to the amount of tonne kilometres per boatmaster.
7. As the methodology involves an evaluation of the accident frequency, yearly effects will show. For 2014, only the 21-year olds originating from Non-CCNR countries will benefit from lower accident frequencies. In 2015, it will be the 22-year olds and the 21-year olds, and so on. This way, the Harmonised requirements scenario will show an increasing safety effect compared to Mutual recognition.

⁷⁰ The effect of this is rather limited: overall as much as 142 current boatmasters from the non-CCNR boatmaster workforce are expected to apply for a Rhine license, whereas 79 new boatmasters from these countries enter IWT per year. See section 7.3.2 on this topic. Thus, this is not taken into account in further analysis.

⁷¹ Panteia et al. (2014), Contribution to the problem definition in the context of the preparation of the Impact Assessment regarding the recognition of professional qualifications in inland navigation

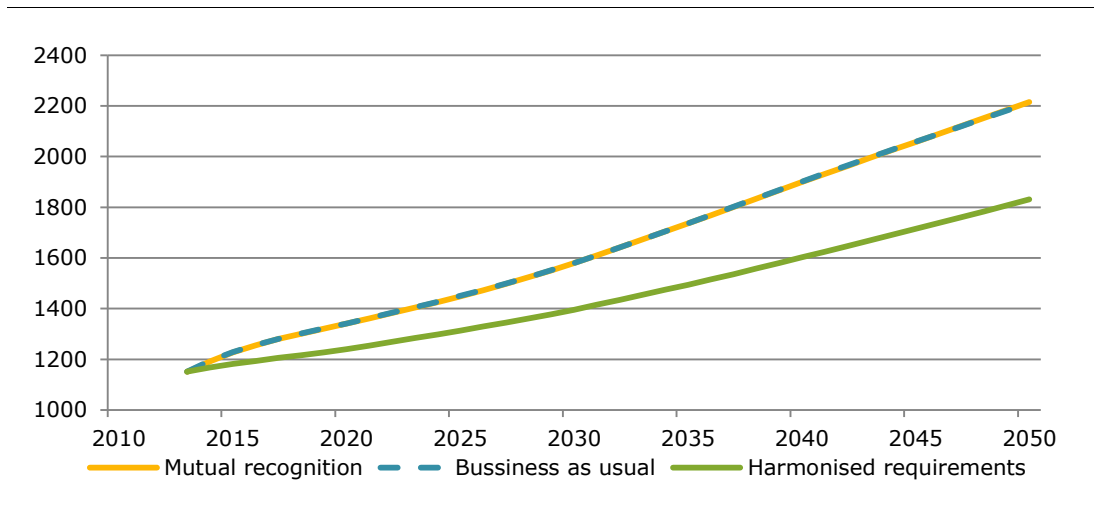
⁷² Ibid



Analysis on the scenarios

The evaluation of the amount of accidents per measure is presented in Figure 5.25.

Figure 5.25 Evolution of the amount of accidents per measure (2013-2050)

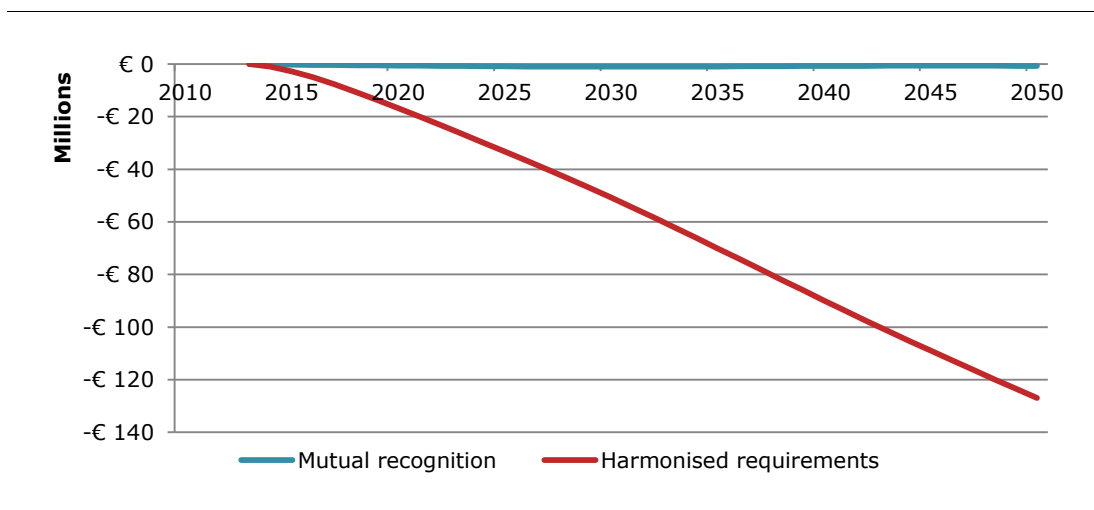


Source: Panteia (2014)

For both scenarios, the number of accidents per year is increasing. This is not due to the fact that workers are more unsafe: it is due to the fact that the transport performance on the European waterways is nearly doubling within the period of scope⁷³. It can however be noticed that the harmonised EU requirements for boatmaster licenses perform much better. This is due to the yearly effect of the new inflow having levelled accident frequencies, whilst differences in accident frequencies remain in case of mutual recognition.

On an average, each navigation-related accidents causes damage to society equal to € 40,357. This way, the Net Present Value of the measures can be calculated for the effects on safety. See Figure 5.26 for the evaluation of the Accumulated Net Present Value over time.

Figure 5.26 Net Present Value of the effects on the measures on safety, compared to BAU (2013-2050)



Source: Panteia (2014)

⁷³ NEA et. al, 2011: Medium and long term perspectives of Inland Waterway Transport in the European Union.



Figure 5.26 shows that Mutual recognition does not have a significant effect on safety: the Net Present Value equals € -1,045,406 for 2030 and € -710,880 for 2050.

Setting harmonised requirements in order to obtain an EU certificate scores the best in terms of increasing safety. The Net Present Value of this measure equals € -50,827,460 in 2030 and increases to € -126,973,893 in 2050.

It must be noted that this is a conservative approach, as also boatmasters from non-CCNR countries that apply for a Rhine license are targeted with this measure. This concerns 142 boatmasters (see section 7.3.2); the effect is considered very limited as compared to the results gathered by the new inflow from these countries.

5.3.7 Measures regarding recognition of functions and qualifications

The measures comprised on this topic include the harmonization and mutual recognition of function names and descriptions. This should lead to better mobility of operational workers in Europe. Three dependent measures are investigated:

- Mutual recognition of functions and qualifications without harmonization;
- Harmonization of function names and qualifications based on EU minimum requirements. Members States can still add functions, according to their local situation.
- Mutual recognition of harmonized function descriptions and professional qualifications;

Additionally, there is one measure that can be implemented independently from the other three: the introduction and mutual recognition of certificates for engineers and helmsmen at Member State level.

The following functions are comprised:

- | | |
|-------------------|------------------|
| 1. Deckhand; | 5. Able Boatman; |
| 2. Apprentice; | 6. Engineer; |
| 3. Boatman; | 7. Helmsman; |
| 4. Engine-minder; | 8. Boatmaster |

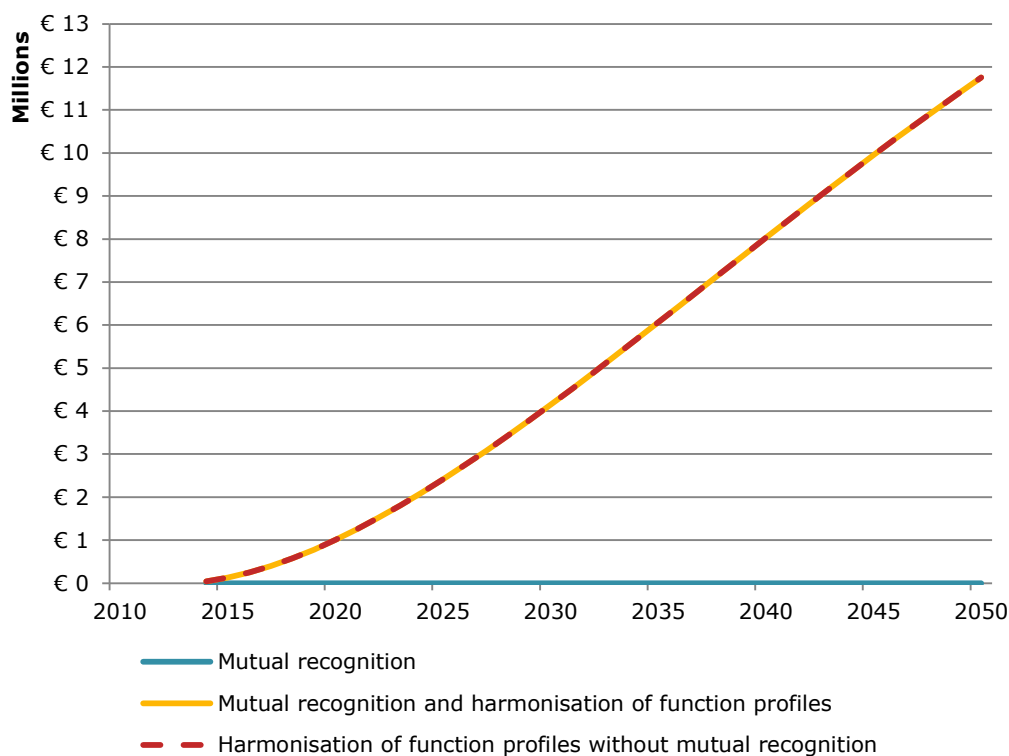
The measure that only includes the mutual recognition of function profiles does not have an effect on safety. The workers affected continue to work in the IWT sector, although their national function might not always be recognized on the Rhine. For the scenarios involving harmonised function profiles, there is a significant safety effect as all workers will have to deal with the same education and examination standards. As differences in accident frequencies exist between workers qualified in CCNR-countries and non-CCNR countries, these measures will have a positive influence on the number of work-related accidents per year. In general, the risk of an IWT worker from a CCNR country is 8.74 per 10,000 workers; for workers from non-CCNR countries this number adds up to 14.06 accidents per 10,000 workers per year⁷⁴.

⁷⁴ Panteia et al. (2014), Contribution to the problem definition in the context of the preparation of the Impact Assessment regarding the recognition of professional qualifications in inland navigation



As each work-related accident costs € 364,775⁷⁵, the total savings on work-related accidents⁷⁶ per year can be calculated by multiplying **1)** the aggregated amount of new entrants from non-CCNR countries per year since 2014 by **2)** the difference in accident frequency and **3)** the costs of a work-related accident. Figure 5.27 shows the Net Present Value of the Measures regarding safety.

Figure 5.27 Net Present Value of the Measures regarding safety



Source: Panteia (2014)

The Net Present Value of the Measures compared to BAU are presented in Table 5.22 for 2030 and 2050.

Table 5.22 Net Present Value of the Measures regarding safety

Total	2030	2050
Mutual recognition	€ 0	€ 0
Harmonisation of function profiles	€ 4,152,186	€ 11,756,340
Mutual recognition and harmonisation of function profiles	€ 4,152,186	€ 11,756,340

Source: Panteia (2014)

5.3.8 Certificates for helmsmen and engineers

No effects on safety are expected for this measure.

⁷⁵ Ibid

⁷⁶ The work-related accidents are assumed to be connected with the operational workers



5.4 Administrative costs

Regarding administrative costs, generally the measures that are aimed at professional qualifications of workers, are not distinctive. Compared to BAU, from the sector perspective, savings may be realised in terms of administrations, for example control authorities, and workers, not needing additional documents.

5.4.1 Certificates for vessels between 20 and 40 metres

In order to determine the administrative costs regarding the certificates for vessels between 20 and 40 metres, the following approach is used:

1. The number of limited licenses issued per year has been estimated, using the labour demand/supply model on inflow of new boatmasters and the percentages on new limited licenses per year as included in Table 5.23.

Table 5.23: Amount of vessels between 20 and 40 metres and their share in the national fleet (2014)

Country	Percentage of new limited licenses per year
Switzerland	1%
France	38%
Germany	12%
Netherlands	7%
Belgium	14%
Poland	3%
Czech Republic	15%
Austria	1%
Hungary	3%
Romania	1%
Bulgaria	1%

Source: Panteia (2014)

2. Based upon the costs of a license, estimates can be made on the administrative costs regarding this measure. Table 5.24 provides information on the estimated costs of a limited boatmaster license. These costs have been estimated, based on the costs of a Dutch license and European CPI factors on government services⁷⁷.

Table 5.24: Costs of issuing a boatmaster license per country (2014)

Country	Price	Country	Price
Netherlands	€ 52.20	Austria	€ 56.81
Belgium	€ 61.03	Slovakia	€ 22.13
Germany	€ 51.18	Czech Republic	€ 25.94
Poland	€ 21.69	Hungary	€ 20.27
France	€ 54.77	Romania	€ 13.84
Switzerland	€ 78.46	Bulgaria	€ 12.28

Source: Panteia (2014), based on CBR tariffs for boatmaster licenses and Eurostat data

3. As the Netherlands and France already issue limited licenses, their administrative costs are not taken into account.
4. All boatmasters are expected to exchange their limited license to a delimited license in their IWT career of 45 years, as this allows them to sail larger barges and thus gives better job opportunities. Besides, the group of targeted vessels (CEMT class I) is expected to decrease from 3,461 vessels in 2012 to 1,666 in 2030 and 548 in 2050.⁷⁸

⁷⁷ Eurostat data on Price level indices (http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=prc_ppp)

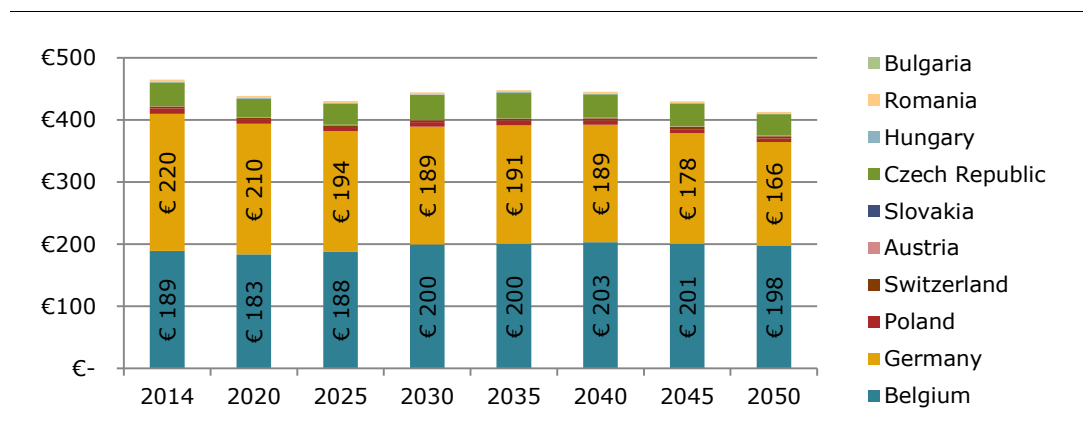
⁷⁸ Panteia et al. (2013), Contribution to Impact Assessment of measures for reducing emissions of inland navigation, section 3.2.3.



Results

In general, this measure will lead to administrative costs per year of around € 450. These administrative costs are more or less constant in the period of scope (2014-2050) (see Figure 5.27).

Figure 5.27 Administrative costs per year for the certificates for vessels between 20 and 40 metres.



Source: Panteia (2014)

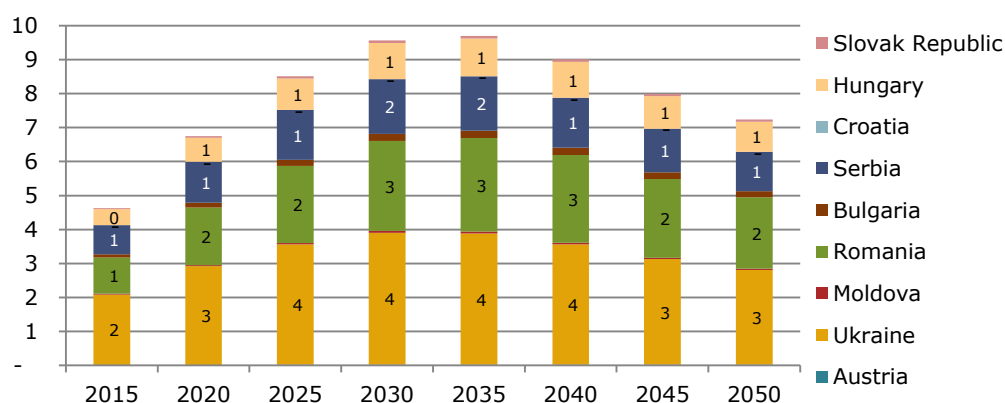
The Net Present Value of this measure regarding the administrative costs adds up to € 5,607 (€5,642 in case of non-EU countries being included) in 2030 and € 8,772 (€ 8,831) in 2050. As can be seen in Figure 5.27, the measure is most likely to show off effects in Belgium and Germany, as many small vessels operate in these countries.

5.4.2 Certificates for large convoys

In order to determine the administrative costs regarding the certificates for large convoys, the following approach is used:

1. The number of licenses to be issued per year is calculated using the labour demand/supply model for boatmasters by applying the general age curves of boatmasters on the amount of boatmasters per country on large convoys. The amount of new entrants needed is calculated by subtracting the demand of boatmasters in the next year ($t+1$) and the amount of boatmasters in this year (t), plus the amount of retiring boatmasters. Results are presented in Figure 5.28.

Figure 5.28 Number of licenses for large convoys issued per country per year



Source: Panteia (2014)



- Based upon the costs of a license, estimates can be made of the administrative costs regarding this measure. Table 5.25 provides information on the estimated costs of a limited boatmaster license. These costs have been estimated, based on the costs of a Dutch license and European CPI factors on government factors.

Table 5.25: Costs of extending a boatmaster license for large convoys per country (2014)

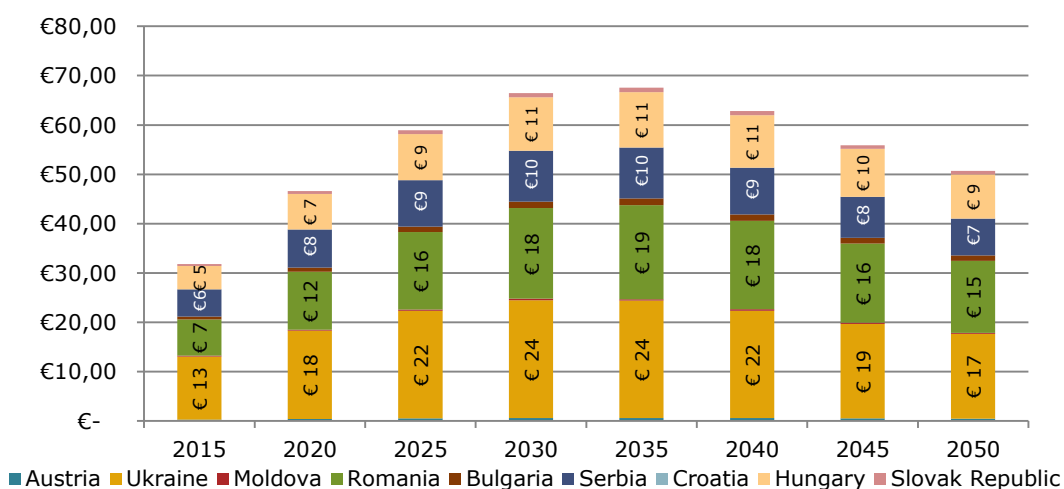
Country	Price
Austria	€ 28.46
Ukraine	€ 6.15
Moldova	€ 6.15
Romania	€ 6.93
Bulgaria	€ 6.15
Serbia	€ 6.42
Croatia	€ 11.53
Hungary	€ 10.15
Slovak Republic	€ 11.09

Source: Panteia (2014)

Results

See Figure 5.29 for the development of the administrative costs.

Figure 5.29 Administrative costs per year for the certificates for large convoys.



Source: Panteia (2014)

In general, this measure will lead to administrative costs per year of around € 30 for 2014 and a maximum of € 67 in 2030-2035, depending on the year of scope. The reason for these costs to vary over the years is due to the age distributions and thus the demand of new boatmasters on large convoys.

The Net Present Value of this measure on administrative costs adds up to € 826.45 in 2030 and € 2,046.15 in 2050. If non-EU countries are not taken into account, the Net Present Value of the measure adds up to € 378.25 in 2030 and € 985.07 for 2050.



5.4.3 No derogation of member states to minimum age for issuing boatmaster licenses

This measure has got no influence on administrative costs.

5.4.4 Measures regarding the frequency of medical check-ups.

Here, three (mutually exclusive) scenarios are considered, and compared to BAU:

- The alignment to 96/50/EC Directive: medical check-up every year after 65
- The alignment to CCNR-standards for medical check-ups: every 5 years between 50-65, yearly after 65.
- The Dutch proposal, which comprises medical checks at 60, 65 and 70 and hereafter once every two years;

In case the frequency of medical checks is changed, there will be cost differences compared to BAU that can be seen as administrative costs. In order to calculate the amount of medical checks per year, the following methodology is used:

1. Continuous age distributions have been derived from the labour demand/supply model, shifting age groups once per year and with regards to new inflow;
2. The amount of people in the hidden reserve has been estimated per year, based upon the current age distributions and using the following percentages for continuation in the hidden reserve:
 - 9.5% of the 65-year olds ;
 - 10.8% of the 66-year olds ;
 - 12.3% of the 67-year olds ;
 - 14.1% of the 68 year olds ;
 - 16.2% of the 69-year olds ;
 - 18.9% of the 70-year olds ;
 - 22.3% of the 71-year olds ;
 - 27.1% of the 72-year olds ;
 - 34.7% of the 73-year olds ;
 - 49.6% of the 74-year olds ;
 - 61.3% of the 75-year olds ;
 - 85.5% of the 76-year olds ;
3. Independent of the measure taken, each year, all the new entrants to the sector will be checked up medically;
4. The number of medical check-ups per year is thus equal to:
 - The amount of new entrants to the sector per year, plus the amount of people aged 50, 55, 60 and 65, plus the amount of workers older than 65 for countries applying the CCNR-approach in the BAU scenario;
 - The amount of new entrants to the sector per year, plus the amount of people aged 65, plus the amount of workers elder than 65 for countries applying the Directive in the BAU scenario;
 - The amount of new entrants to the sector per year, plus the amount of people aged 50, 55, 60 and 65, plus the amount of workers elder than 65 for the CCNR-approach;
 - The amount of new entrants to the sector per year, plus the amount of people aged 65, plus the amount of workers elder than 65 for the Directive;
 - The amount of new entrants to the sector per year, plus the amount of people aged 60, 65, 70, 72, 74 and 76 for the Dutch proposal.

In the BAU scenario, Member States use different approaches as can be seen in Table 5.26. Figure 5.30 shows the amount of medical checks, depending on the scenario chosen.



Table 5.26: Current approach used now by Member States connected to the interconnected European IWT network (2014)

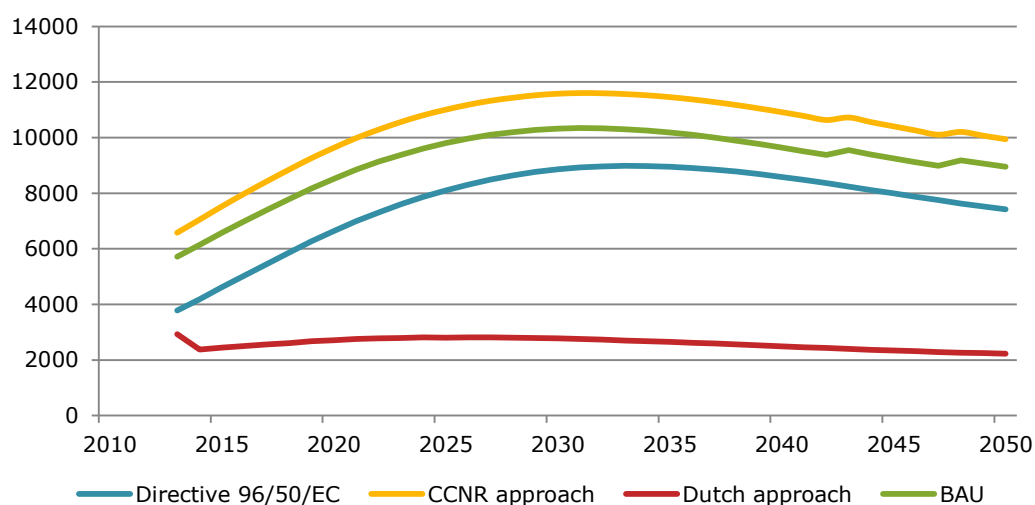
Country	Approach
Netherlands	CCNR
Belgium	CCNR
Germany	CCNR
Poland	Directive
France	Directive
Switzerland	CCNR
Austria	Directive
Slovakia	Directive
Czech Republic	National approach ¹
Hungary	National approach ²
Romania	CCNR
Bulgaria	Directive
Other countries (Luxemburg, UK, Italy, Sweden, Finland, etc.)	Directive

¹ The Czech Republic obliges medical check-ups every ten years, starting at the age of 50.

² Hungary obliges medical check-ups every five years, and starting from 65 once every year.

Source: *Living and working conditions in inland Navigation in Europe, ILO (2014)*

Figure 5.30: Amount of medical checks per year depending on the scenario chosen.



Source: *Panteia (2014)*

Consumer price indices vary among the countries in Europe. This way, the amount of money involved with medical checks, compared to the BAU scenario, differs. In general, the CCNR countries have the largest workforce in IWT. However, EU Member States such as Romania and Bulgaria have a large workforce as well and a significantly lower CPI⁷⁹. We have assumed the following costs for a medical check-up, based on information from the Dutch government⁸⁰. Based on the Price Level Indices for health expenses, the costs for medical check-ups have been estimated for the other European countries (see Table 5.27).

⁷⁹ CPI stands for 'Consumer Price Index'

⁸⁰ € 130.00 excl. VAT. This is the maximum price. Prices could be lower than this at some places.



Table 5.27: Maximum costs of a medical check-up (2014)

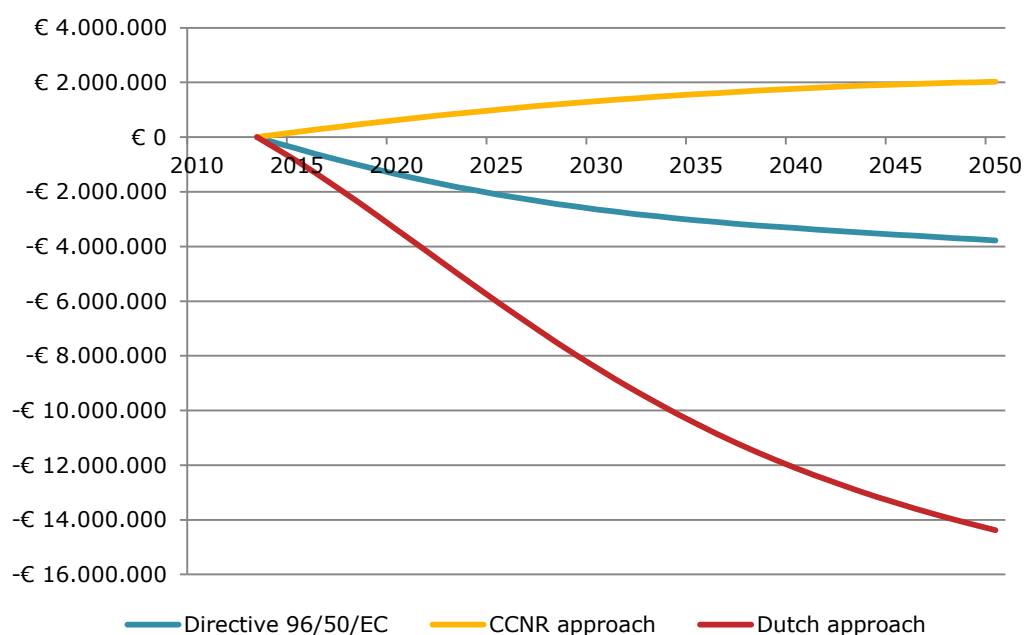
Country	Max price for health check	Country	Max price for health check
Austria	€ 126.70	Hungary	€ 38.45
Belgium	€ 123.20	Netherlands	€ 130.00
Bulgaria	€ 28.25	Poland	€ 39.90
Czech Republic	€ 56.12	Romania	€ 29.22
France	€ 111.55	Slovakia	€ 44.66
Germany	€ 94.95	Switzerland	€ 202.82
Hungary	€ 38.45	Hungary	€ 38.45

* For other countries, the Dutch tariff has been used.

Source: Eurostat data on [Price Level Indices](#) and the maximum tariff of the Netherlands (ILT)

Multiplying the amount of medical check-ups per country by the costs of a medical check-up gives the total amount of costs involved with medical check-ups. This has been compared with the BAU scenario. Results are shown in Figure 5.31.

Figure 5.31: Net Present Value of the costs difference for medical check-ups compared to BAU (base year 2013)



Source: Panteia (2014)

With 2030 as a time horizon, for the Dutch proposal savings are highest on medical check-ups (Net Present Value: € - 7,714,554 / € -8,430,428 if non-EU countries are included). Also the EU Directive leads to some savings (NPV: € -2,337,537 / € -2,639,632). The more strict CCNR-policy on the other hand, will result in more costs (NPV: € 1,331,919) for medical check-ups.

For 2050 as a time horizon, these are the Net Present Values:

- Dutch proposal: savings up to € -13,155,789 / € -14,373,849.
- EU Directive leads to some savings € -3,333,016 / € -3,739,540).
- CCNR-policy: extra costs of € 2,068,930 for medical check-ups.



5.4.5 Measures regarding minimum professional experience

Three (mutually exclusive) measures are compared to the BAU scenario:

- The Directive 96/50/EC for the whole of Europe, without exemption on the Rhine; 4 years of experience, but experience, training (three years) or passing a practical exam may bring this down to 1 year. The path only based on experience will take four years.
- The Rhine approach for the whole of Europe: 4 years of experience, but experience or training (three years) may bring this down to 2 years⁸¹. The experienced based path will take at least five years, as it requires three years of experience to become boatman from the position of deckhand and the CCNR requires at least two years as a boatman to become a boatmaster.
- A competence-based approach to assess the professional experience demonstrated a minimum of one year of navigation service and competence proved by either professional training certified by a school diploma or the successful passing of an administrative exam (which may include practical or a simulator examination)

Only the competence-based approach will incur administrative costs for the practical exams. In the Netherlands, the practical exams consists of four exams on school ships⁸². In order to estimate the costs per exam, the yearly costs of a school ship are taken into account and estimated at € 930,000⁸³. With 5 days of operation per week, the daily costs are € 3,577. On top of this, the number of exams per year will be added, which is dependent on the number of expected candidates per year. Furthermore, costs for two examiners are added. Table 5.28 shows the costs of practical exams in other European countries:

Table 5.28 Estimated costs for a practical exam in European countries.

<i>Total</i>	<i>Practical exam</i>		
Netherlands	€ 2,060	Czech Republic	€ 3,118
Belgium	€ 3,360	Slovakia	€ 2,508
Germany	€ 2,784	Austria	€ 4,780
Poland	€ 3,192	Hungary	€ 2,492
France	€ 3,224	Bulgaria	€ 2,187
Switzerland	€ 3,112	Romania	€ 2,332

Source: Panteia expert estimation

Methodology

The total administrative costs for the competence based approach are determined using the following methodology:

1. For every country, 15% of the inflow is considered to obtain their qualifications by a practical exam (For further background see Annex 4);
2. In order to estimate the lateral inflow, a factor has been used that is equal to the percentage of lateral entrants on the total workforce. This percentage equals 0.3% of the total workforce⁸⁴.
3. The sum of the first two steps indicates the amount of applicants.

⁸¹ Dienstinstructies voor bevoegde autoriteiten overeenkomstig artikel 1.03 van het RSP. Annex 1 to instruction no. 1.

⁸² <http://www.onderwijs-binnenvaart.nl/home/bedrijven/cursussen/faq-praktijkexamen-schipper.html>

⁸³ <http://www.hintproject.net/getpage.php?page=danube-school-ship>

⁸⁴ Nederland Maritiem Land (2012) has reported 60 lateral entrants. It has been assumed that 17 of these workers to be school leavers, as the amount of students enrolled is taken as a proxy to the inflow from education institutes. Not all of these students will however finish their education. In total, the IWT workforce of the Netherlands equals 13,908 people. This way, the following equation can be made in order to estimate the factor for lateral entrants: $(60 - 17) / 13,908 = 0,3\%$ of the total workforce.

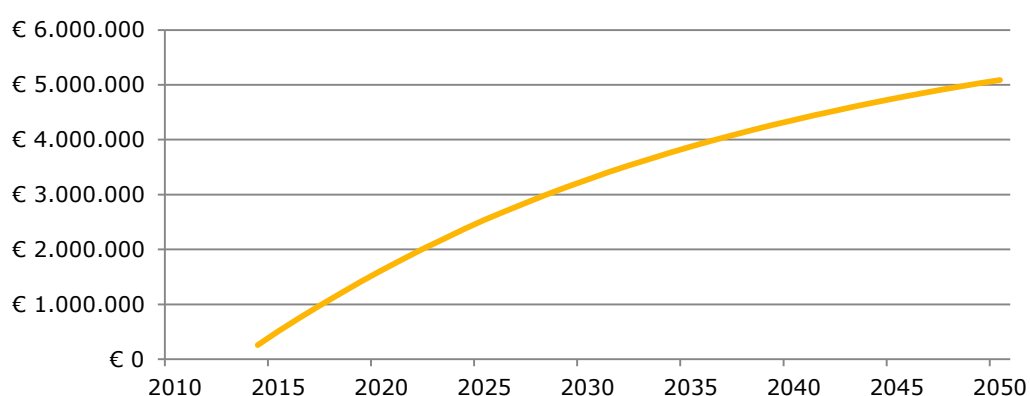


4. Not all applicants will successfully pass their practical exams. Data from STC (2014) and 'Onderwijs Centrum Binnenvaart' (2014) indicated 2 failed exams on a total of 7 exams. This way, a factor of 1.29 has been used to correct for failed exams (7 exams + 2 repeated exams, divided by 7 persons).
5. In order to determine the administrative costs, the total amount of exams is multiplied by the costs for an exam, see Table 5.26.

Results

The results of this analysis are presented in Figure 5.32 and Table 5.29.

Figure 5.32 Net Present Value of the administrative costs of the measure regarding minimum experience



Source: Panteia (2014)

Table 5.29 Net Present Value of the administrative costs of the measure regarding minimum experience

Total	2030	2050
Directive 96/50/EC	€ 0	€ 0
CCNR-approach	€ 0	€ 0
Competence based approach	€ 3,222,534	€ 5,004,079
<i>Non-EU countries included</i>	€ 3,274,380	€ 5,089,874

Source: Panteia (2014)

5.4.6 Measures regarding recognition of certificates

This measure has got no influence on administrative costs.

5.4.7 Measures regarding recognition of functions and qualifications

The analysis in section 5.2.7 showed limited differences across the function descriptions and the required professional qualifications and navigation time between the Member States of Europe. However, there were limited differences, most notably between Poland and the Czech Republic on the one hand, and the other European Member States on the other hand. The largest difference exists between Rhine regulations and national regulations. This way, 6.6% of the IWT workforce is affected.

For the measures, two separate problems can be identified from the analysis in the previous section (§ 5.2.7 regarding mobility). These problems are:

1. Differences in function descriptions between Member States reciprocally;
2. Differences in function descriptions between Member States and the Rhine Commission.



Differences in function descriptions between Member States reciprocally

The current system of multilateral agreements regarding mutual recognition of service record books seems to work well: in order to be able to work on the Rhine, all operational workers were required to hold a Rhine SRB up until 1 July 2011. As the SRB's in the Czech Republic, Poland and many of the Danube States are issued in the same format as the Rhine SRB, it was considered to recognise the validity of the non-Rhine SRBs on the Rhine. This has resulted in a Multilateral Administrative Agreement, signed on 8 December 2010 by the CCNR and the competent ministries of seven central European countries, i.e. Austria, Bulgaria, Hungary, Poland, Romania, the Czech Republic and Slovakia. The signatories agreed to mutually recognise the SRB issued by their respective competent authorities. This arrangement came into force on 1 July 2011.

The Multilateral Administrative Agreement has resulted in the mutual recognition of functions on national river systems. The SRB plays a crucial role here. In case the SRB is lost, problems may arise regarding the proof of professional qualifications and experience as not all underlying certificates and diplomas are recognised throughout Europe. A Dutch boatman will be a boatman on German waterways, as well as waterways of any of the signatory countries, as long as the Service Record Book provides a proof of his qualifications. In case there is no SRB, problems arise as workers now have to rely on Council Directive 2005/36/EC on the recognition of professional qualifications. The procedure to demonstrate equivalence is time consuming and a burden for crew members.

The Regulated Professionals Database⁸⁵ includes seven records on requests of professionals that have applied for recognition of their qualifications in other countries. See Table 5.30.

Table 5.30 Number of decisions taken on professionals who obtain professional qualifications in one country (country of qualification – listed in rows) and apply for recognition in another country

	CZ ⁸⁶	PL ⁸⁷	Total
Germany (DE)	3	1	4
Netherlands (NL)	1	0	1
Slovakia (SK)	2	0	2
Total	6	1	7

Source: *Geography of mobility* (http://ec.europa.eu/internal_market/qualifications/regprof/index.cfm) on inland navigation professions

Based upon the fact that:

1. There have been only seven requests in the field of inland navigation since the introduction of Council Directive 2005/36/EC on the recognition of professional qualifications;
2. And these mostly apply for the job of self employed boatmaster / boat owner- in the Czech Republic. This is a function that is not included in the list of functions that shall be harmonised or mutually recognised.

⁸⁵ http://ec.europa.eu/internal_market/qualifications/regprof/index.cfm

⁸⁶ This involved the function of 'provozování vodní dopravy pro cizí potřeby', translated as a self-employed boatmaster. Czech definitions require 5 years of practice in the boat transport profession – according to the Decree No. 84/2000 Coll. of the Czech legislation, as well as an exam after passing the practice according to the supplement Decree No. 84/2000 Coll. of the Czech legislation. Subjects as financial management are examined.

⁸⁷ This involved the function of 'sternik', translated as helmsman. Polish definitions require examination for this function.



The administrative costs of the measures regarding recognition of functions and qualifications are considered negligible for differences in function descriptions between Member States reciprocally.

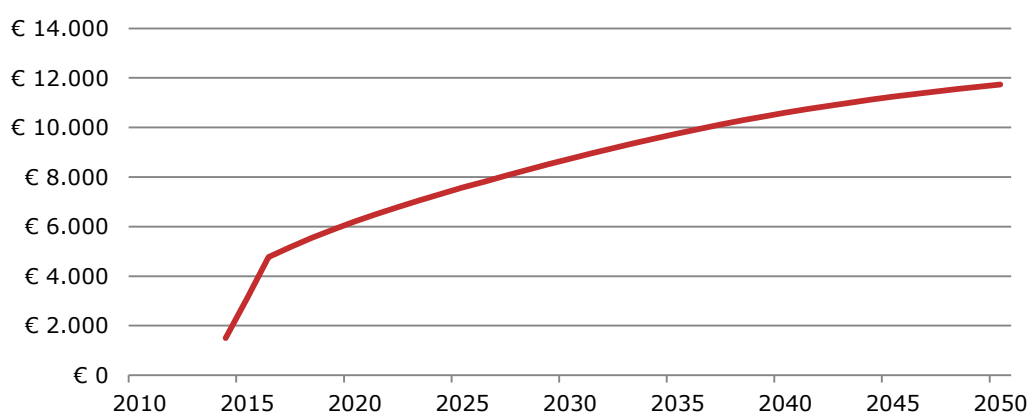
Differences in function descriptions between Member States and the Rhine Commission

In section 5.2.7, it has been estimated that 6.6% of the total workforce in IWT is affected by differences in function descriptions. A huge group of these workers originate from non-CCNR countries and the function that is affected the most, is the function of boatman. In total, 20% of the non-CCNR boatman are downgraded by CCNR-regulations to deckhand, opposed to 0.6% of CCNR-workers. The main reason for this downgrading is the fact that professional experience gained by IWT education is not recognized by the CCNR. In order to estimate the administrative costs of the measures regarding the mutual recognition of functions and qualifications, the following methodology has been applied:

1. Based upon the labour/demand supply model subset for operational workers, the amount of boatmen originating from non-CCNR has been calculated for current workers and the future workers (new inflow from IWT education institutes).
2. Based upon the distribution rate of operational workers to a corridor, the number of operational workers from non-CCNR countries that wish to work on the Rhine corridor is estimated.
3. The number of these workers that are affected by the downgrading has been estimated using the 20% downgrading for boatman originating from non-CCNR countries as calculated in the analysis in § 5.2.7.
4. This will indicate the number of boatmen that are downgraded to deckhand and are thus unable to operate on the Rhine using their national qualification;
5. These workers will need three years of navigation experience before they can work as a boatman. This will incur three additional checks of the Service Record Books in a Rhine river country. For this, an average cost of € 120 has been taken⁸⁸.
6. This way, the total administrative costs for the measures can be estimated.

Results are presented in Figure 5.33. The NPV adds up to € 8,734 in 2030 and € 11,738 in 2050. These costs can be saved if the measures are applied.

Figure 5.33 Net Present Value of administrative costs regarding measures regarding mutual recognition of function descriptions and qualifications



Source: Panteia (2014)

⁸⁸ This is the average tariff in the Netherlands. For further details on costs of SRB-checks, please proceed to paragraph 8.2.

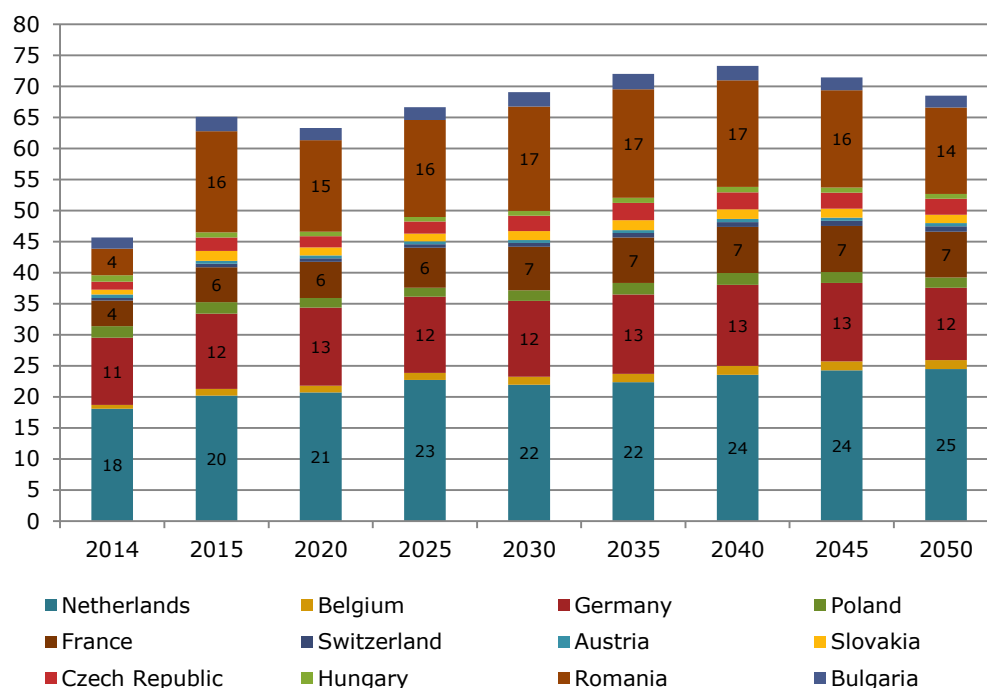


5.4.8 Certificates for helmsmen and engineers

In order to determine the administrative costs regarding the certificates for helmsman and engineers, the following approach is used:

1. The number of certificates issued per year has been estimated, using the labour demand/supply model on inflow of new operational workers, with a delay of two years⁸⁹. Furthermore, the share of workers aged 20 now is taken as a proxy to the amount of certificates being delivered in 2014 (see Figure 5.33)

Figure 5.33 Number of certificates issued for helmsmen and engineers per year per country.



Source: Panteia (2014)

2. Based upon the costs of a license, estimates can be made on the administrative costs regarding this measure. Table 5.31 provides information on the estimated costs of a limited boatmaster license. Costs have been estimated, based on the costs of a Dutch license and European CPI factors on government factors.

Table 5.31: Costs of issuing a boatmaster license per country (2014)

Country	Price	Country	Price
Netherlands	€ 52.20	Austria	€ 56.81
Belgium	€ 61.03	Slovakia	€ 22.13
Germany	€ 51.18	Czech Republic	€ 25.94
Poland	€ 21.69	Hungary	€ 20.27
France	€ 54.77	Romania	€ 13.84
Switzerland	€ 78.46	Bulgaria	€ 12.28

Source: Panteia (2014)

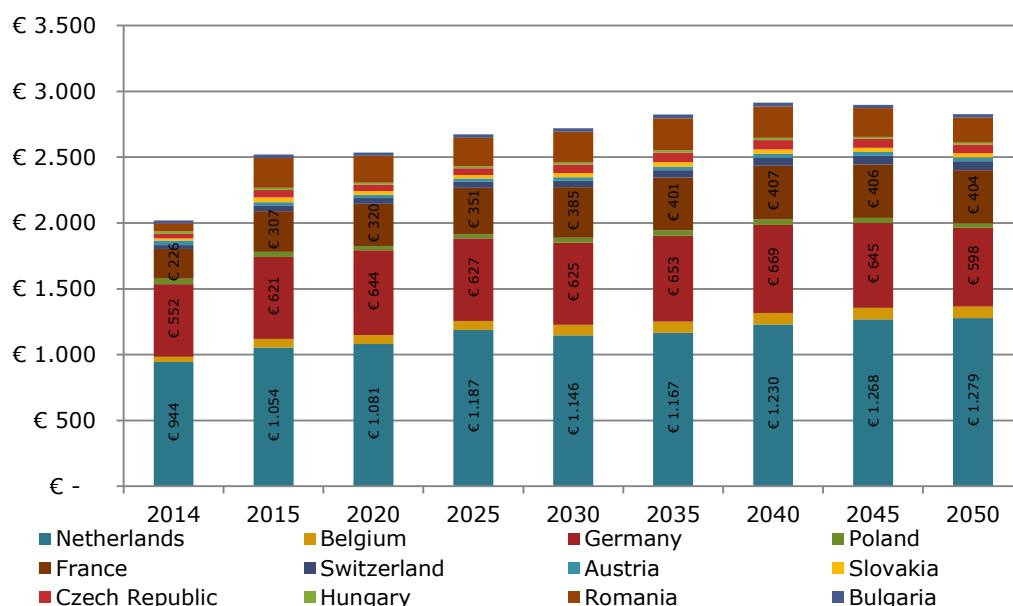
⁸⁹ For an educated IWT worker, it will take one year to possess the function of able boatman and two years to possess the function of helmsman or engineer.



Results

This measure will lead to administrative costs per year of around € 1,294. This price is more or less maintained throughout the period of scope (2014-2050), see Figure 5.34.

Figure 5.34 Administrative costs per year for the certificates issued for helmsmen and engineers



Source: Panteia (2014)

In general, the Net Present Value of this measure on administrative costs adds up to € 31,728 (€ 32,292 in case non-EU countries are included) in 2030 and € 52,051 (€ 53,050) in 2050.

5.5 Employment and job creation in inland navigation

There are no jobs created because of the measures, but existing gaps can be better filled as the employability of workers in IWT will increase. Mutual recognition of professional qualifications will level mobility barriers, as there will be less situations where the appraisal of IWT workers qualifications differ between Member States. This enhances the availability of staff.

5.6 Improved job quality/ job attractiveness

Measures are aimed at levelling labour market barriers in the EU. This creates a basis for an improved free movement of personnel within the EU. Job quality and job attractiveness will improve, as also opportunities for advancement increase. In order to create a basis for an estimate how measures contribute to job quality and job attractiveness, Table 4.2 is used. It is assumed that the different areas that determine job quality are relatively independent and that the more of these areas a measure scores, the higher the effect a measure has on job quality. In addition to this, it is important how many workers in IWT are influenced by this increased job quality over a certain period (here a period of one year has been taken). The combination of effect on job quality and the number of affected workers together determine the (qualitative) impact of a measure on job quality. In the following Table 5.32, these score have been shown. Depending on these scores, a ranking of the measures has been determined.



Table 5.32: Job Quality scores per measures of Problem Driver 1 regarding difficulties with mutual recognition of professional qualifications of workers from within the IWT sector

Measure	Job quality / attractiveness indicators										# Workers (yearly)	Total score
	Work autonomy	Physical working	Health implications	Risks	Pace of work and workload	Social working environment	Meaningfulness	On-the-job training	Participation	Opportunities for advancement	Formal training	Type of contract
Measures aimed at boatmasters												
Certificates for vessels between 20 and 40 metres	++						+		+		10	+
Certificates for large convoys									-		5-10	-
No derogation of member states to minimum age for issuing boatmaster licenses						--					10	-
Measures regarding the frequency of medical check-ups.												
The 96/50/EC Directive: medical check-up every year after 65				+							4,700	+
The CCNR approach for medical check-ups: every 5 years between 50-65, yearly after 65				+							10,000	+
The Dutch proposal, which comprises medical checks at 60, 65 and 70 and hereafter once every two years;				+							3,858	+
Measures regarding minimum professional experience												
4 years, training may bring this down to 1	+						+		+		300	+
4 years, training may bring this down to 2	-						-		-		300	-
Competence based approach	+						+				300	+
Measures regarding recognition of certificates												
Mutual recognition of BM certificates	+					+			+		658 ¹ 967 ²	+
Harmonised requirements for a EU certificate	+					+			+		300	+
Measures aimed at operational workers												
Mutual recognition without harmonization	+					+			+		30,000*	++
Harmonization of functions, MS may add	+					+			+		600	+
Mutual recognition of harmonized functions and professional qualifications	+					+			+		30,000*	++
Certificates for helmsmen and engineers	+					+			+		100	+

* This includes a one-off effect, starting from the introduction year of the measure. Afterwards, all new entrants will be affected.

¹ Boatmasters from interconnected waterways who do not have their Directive 96/50/EC or Directive 91/672/EEC license recognised by the CCNR by bilateral agreements.

² Boatmasters from interconnected and non-interconnected waterways who do not have their license recognised by the CCNR by bilateral agreements.

Source : Panteia (2014)



5.7 Impact on SMEs

Generally, in recruitment it will be easier to determine whether a person meets the requirements. In particular for small IWT companies, that do not have professional HR support this is a benefit. Further, the group in which personnel can be recruited is larger. This will make recruitment easier, from a sheer numerical point of view.

5.8 Impact on third countries

There is a limited impact on third countries regarding the measures. Switzerland would be faced with a need to adapt legislation in case of changes in regulations on the river Rhine. The same would count for Serbia with regards to the Sava river and Ukraine and Moldova regarding the Danube.

Table 5.33: Costs to third countries per measure.

Measure	Investment costs	Mobility	Safety	Administrative costs	Total costs
Measures aimed at boatmasters					
Certificates for vessels between 20 and 40 metres	0	0	0	-0.035k	-0.035k
Certificates for large convoys	1k	-114k	pm	-0.5k	-113.5k
No derogation of member states to minimum age for issuing boatmaster licenses	0	0	0	0	0
Measures regarding the frequency of medical check-ups.					
The 96/50/EC Directive: medical check-up every year after 65	0	0	-26k	302k	276k
The CCNR approach for medical check-ups: every 5 years between 50-65, yearly after 65	0	0	0	0	0
The Dutch proposal, which comprises medical checks at 60, 65 and 70 and hereafter once every two years;	0	0	-94k	715k	621k
Measures regarding minimum professional experience					
4 years, training may bring this down to 1	0	2,375k	pm	0	2,375k
4 years, training may bring this down to 2	0	-117k	pm	0	-117k
Competence based approach	-200k	2,375k	pm	-52k	2,223k
Measures regarding recognition of certificates					
Mutual recognition of BM certificates	0	0	0	0	0
Harmonised requirements for a EU certificate	0	0	0	0	0
Measures aimed at operational workers					
Mutual recognition without harmonization	0	1,024k	0	0	1,024k
Harmonization of functions, MS may add	0	154k	0	0	154k
Mutual recognition of harmonized functions and professional qualifications	0	1,024k	0	0	1,024k
Certificates for helmsmen and engineers	4k	787k	0	-0.6k	782k

Source : Panteia (2014)



6 Difficulties with mutual recognition of relevant professional experience of workers from outside the sector

In this chapter, the impact of the measures concerning the second problem driver will be assessed. This problem driver deals with difficulties with regards to mutual recognition of relevant professional experience of workers from outside the sector. Focus here will be on workers from the maritime sector that consider a career change to the IWT sector. The essential element of the measures proposed here is that a reduction of the required IWT experience can be reached, based upon the experience that has been gained at sea. In doing so, for every maritime or related worker from outside the sector the IWT sector can be entered at lower cost (maritime experience can be capitalised). Furthermore, EU Member States set the same requirements. Thus, a level playing field is created. In the current situation (BAU) it is assumed that CCNR countries apply CCNR regulations on all waterways⁹⁰, while other countries are assumed to apply EU Directive 96/50. Concretely, proposed measures comprise:

For boatmasters:

- Setting EU minimum requirements, in accordance with EU proposal meaning reducing required professional experience to 1 year (instead of 4 years)
- Setting EU minimum requirements in accordance with CCNR meaning reducing required professional experience to 2 year reduced (instead of 4 years)

For all crew:

- Setting EU minimum requirements, in accordance with EU proposal meaning reducing required professional experience taking into account 75% of maritime experience gained for the calculation of navigation experience⁹¹.

Approach

To quantify the effects of these measures, the following approach was used:

1. The workforce in the maritime sector per country of Europe was determined, based on a report by Guy Sulpice (2011)⁹².
2. The workforce in the maritime sector was multiplied by the percentage of nationals working in the maritime sector⁹³, resulting in the amount of nationals per country working in the maritime sector.
3. Based on data from the Netherlands⁹⁴, it is assumed that 0.6% of the workers will change their career from the Maritime Sector to the IWT sector. A linear mechanism was assumed based on the ratio between the IWT and the maritime sector in relevant EU countries. Based on this, the amount of career changes per year has been determined for all relevant EU countries (countries with both seafarers and IWT).
4. Multiplying the career changes by the national workforce in the relevant country resulted in the amount of officers and ratings per country moving to the IWT sector per year.
5. For countries applying the current CCNR-standards, the amount of workers willing to change their career was estimated as twice as much as the amount of those who actually change their career, as the current, more strict approach is seen as a mobility barrier.⁹⁵

⁹⁰ This is the case in The Netherlands. However, Germany applies the Rhine regulations for the Rhine only. On the non-Rhine waterways, the Directive is applied.

⁹¹ For the qualification of boatman, CCNR requires minimum 1 year of experience in inland navigation out of required 3 years of navigation experience. In other words, max. two years of maritime experience can be taken into account as valuable experience. It must be noted that most MS apply this rule as well, see section 5.2.7.

⁹² Study on EU Seafarers Employment, Guy Sulpice (2011), EC DG MOVE- Maritime Transport, <http://ec.europa.eu/transport/modes/maritime/studies/doc/2011-05-20-seafarers-employment.pdf>

⁹³ Ibid

⁹⁴ Policy Research (2012), Nederland Maritiem Land 2012

⁹⁵ Panteia et al. (2014), Contribution to the problem definition in the context of the preparation of the Impact Assessment regarding the recognition of professional qualifications in inland navigation, Box 4.3



Workforce in Maritime Sector

Table 6.1 Workforce in Maritime Sector (2011)

Nationality	Officers ⁹⁶	Ratings	Percentage	Percentage	Officers	Ratings
			<i>national captains</i>	<i>national deck crew</i>	<i>National</i>	<i>national</i>
Belgium	498	92	15%	3%	75	3
Bulgaria	10,890	22,379	100%	100%	10,890	22,379
Denmark	2,762	1,176	77%	42%	2,127	494
Estonia	2,700	6,300	35%	87%	945	5,481
Finland	3,000	1,200	98%	95%	2,940	1,140
France	4,568	9,128	88%	81%	4,020	7,394
Germany	3,967	6,256	74%	55%	2,936	3,441
Italy	9,560	11,390	99%	66%	3,085	1,763
Latvia	5,509	2,383	56%	74%	2,799	1,711
Lithuania	2,916	2,479	96%	69%	-	-
Luxembourg	2,272	2,164	0%	0%	-	-
Netherlands	3,014	560	53%	7%	17,744	4,746
Poland	17,923	4,746	99%	100%	88	432
Portugal	419	1,802	21%	24%	18,575	5,768
Romania	18,575	5,768	100%	100%	3,117	3,128
Spain	3,181	3,862	98%	81%	5,243	3,575
Sweden	5,958	4,965	88%	72%	2,127	494
UK	14,657	8,536	67%	67%	9,820	5,719

Source: Guy Sulpice (2011)

Table 6.2 Estimated lateral inflow from Maritime sector to IWT in 2011⁹⁷

Nationality	Approach	Workers	Ratio	Switch	Switch	Number of	Number of
		<i>IWT</i>	<i>Seafarers/IWT</i>	<i>ratio_bm</i>	<i>ratio_ow</i>	<i>boatmasters</i>	<i>operat. w.</i>
Belgium	CCNR	2,399	30.97	2.187%	2.187%	1.6	0.1
Bulgaria	Directive	1,679	0.05	0.011%	0.004%	1.2	0.8
Denmark	Directive	143	0.05	0.012%	0.004%	0.2	0.0
Estonia	Directive	61	0.01	0.002%	0.001%	0.0	0.0
Finland	Directive	267	0.07	0.014%	0.005%	0.4	0.1
France	CCNR	3,700	0.32	0.023%	0.023%	0.9	1.7
Germany	CCNR	5,589	0.88	0.062%	0.062%	1.8	2.1
Italy	Directive	2,553	0.15	0.032%	0.011%	3.0	0.8
Latvia	Directive	106	0.02	0.005%	0.002%	0.1	0.0
Lithuania	Directive	145	0.03	0.007%	0.002%	0.2	0.0
Netherlands	CCNR	13,908	8.50	0.600%	0.600%	9.6	0.2
Poland	Directive	616	0.03	0.006%	0.002%	1.0	0.1
Portugal	Directive	853	1.64	0.347%	0.116%	0.3	0.5
Romania	Directive	2,329	0.10	0.020%	0.007%	3.8	0.4
Spain	Directive	388	0.06	0.013%	0.004%	0.4	0.1
Sweden	Directive	1,101	0.12	0.026%	0.009%	1.4	0.3
UK	Directive	1,051	0.07	0.014%	0.005%	1.4	0.3

Source: Panteia (2014), based on Problem Definition, NML 2012 and Guy Sulpice (2011)

⁹⁶ Officers are captains on maritime vessels, ratings are the engine and deck crew.

⁹⁷ How to read this table: i.e. for Belgium, 1.6 boatmasters are expected to change career from maritime to IWT as a boatmaster and for operation staff 0.1 workers.



6.1 Investment costs

Investment costs are considered negligible, as these measures only concern the adaptation of regulations and no further costs for the implementation of the measures are expected. This way, costs incurred for BAU and the policy measures are not different.

6.2 Mobility within the inland navigation labour market, functioning of the internal market and fair competition

In case of a mutual recognition of professional qualifications of entrants to the IWT sector from the maritime sector, mobility barriers will be levelled.

At this moment, potential boatmasters can have different ratings on the Rhine and on the other corridors. This applies to workers originating from the sector, as well as workers from the maritime sector, as CCNR reduces the required professional experience to two years and the EU Directive 96/50 to one year. For the operational workers, there will be a status quo as regulations are more or less across the Member States.

- If the CCNR current standards are applied within the EU, 28 boatmasters per year would be affected in a way that they need an extra year of experience in order to obtain the function of boatmaster in the IWT sector⁹⁸.
- If the EU Directive 96/50 current standards applied in the whole EU, this affects 28 boatmasters in a way that they need one year less of experience in order to obtain the function of boatmaster in the IWT sector⁹⁹.
- If the EU proposal for all crew is applied, 8 operational workers per year will be affected in a way that they need one year less of experience in order to obtain the function of boatman in the IWT sector¹⁰⁰.

6.3 Safety

Compared to CCNR-standards, the EU approach with respect to the maritime experience taken into account for obtaining the boatmaster certificate is more flexible as it requires less experience. This approach could therefore in theory be considered as less safe. However, although there is no information available on the fact how many years the maritime workers that enter the sector have spent at sea, it may be assumed that most of these workers already have gained considerable experience in the maritime sector. Given the fact that additional experience is requested in both approaches, the additional risk of a worker from the maritime sector will be virtually zero, in both approaches. Therefore it is assumed that CCNR adoption of EU standards with respect to the recognition of professional qualifications of entrants to the IWT sector from the maritime sector as such would not have an impact on safety.

⁹⁸ From Table 6.2, it can be observed that ~14 workers originate from countries that apply the EU Directive. Applying the CCNR directive would mean one extra year of experience for the workers now and the workers in the previous year. Thus, $14 \times 2 = 28$

⁹⁹ From Table 6.2, it can be observed that 14 workers originate countries that apply the CCNR standards. This has got effects on the workers now and in the previous year: thus $14 \times 2 = 28$.

¹⁰⁰ From Table 6.2, it can be observed that 7.6 operational workers switch to IWT per year. As in BAU, these workers can take up to a maximum of two years of professional experience on sea, still one year of experience in inland navigation is required.



6.4 Administrative costs

6.4.1 Influence for boatmasters

The costs to obtain a boatmaster license are € 134.85 per year in the Netherlands. Besides, a Service Record Book is needed for the extra workers. This Service Record Book costs € 52.57 in the Netherlands. In order to award the professional experience gained in maritime, € 19.80 is charged. Such a check is also needed to prove the professional experience required for the boatmaster license. If the CCNR standards are applied, additional costs of the yearly check of € 19.80 are charged.

This brings the costs for the Directive in the Netherlands to € 52.80 (SRB) plus € 19,80 for the maritime experience plus €19.80 for the prove of professional experience for the boatmaster license plus € 134.85 for the license itself, giving a total of € 227.02. The CCNR standards require one extra check (as two years of professional experience in inland navigation are required) and thus the total costs are € 246.82. By using Eurostat's CPI factors on government services, the yearly costs for boatmaster licenses, Service Record Books and checks can be calculated for the measures by multiplying the total costs per country by the amount of boatmasters applying (Table 6.2).

See Table 6.3 for the costs of boatmaster licenses in other European countries.

Table 6.3 Costs of a boatmaster license in countries other than the Netherlands (price level 2012)

Country	Factor	Costs Directive	Costs CCNR	Country	Factor	Costs Directive	Costs CCNR
Belgium	117%	€ 265.40	€ 288.55	Latvia	40%	€ 90.65	€ 98.56
Bulgaria	24%	€ 53.43	€ 58.09	Lithuania	37%	€ 82.94	€ 90.17
Denmark	124%	€ 282.38	€ 307.00	Poland	42%	€ 94.32	€ 102.54
Estonia	45%	€ 102.81	€ 111.77	Portugal	60%	€ 136.56	€ 148.47
Finland	103%	€ 233.00	€ 253.32	Romania	27%	€ 60.18	€ 65.43
France	105%	€ 238.21	€ 258.98	Spain	72%	€ 162.98	€ 177.20
Germany	98%	€ 222.58	€ 242.00	Sweden	111%	€ 251.13	€ 273.03
Italy	97%	€ 221.23	€ 240.53	United K.	89%	€ 202.91	€ 220.61

Source: Panteia (2014), based on Eurostat CPI factors and data from SABNI (www.sabni.nl) and CCV (www.cbs.nl/ccv)

In the BAU situation, the costs are € 5,505 per year. For the CCNR-standards, this figure is € 4,236 and for the Directive this is € 11,689.

The Net Present Value of the CCNR standards compared to BAU adds up to - € 16,053 in 2030 and - € 25,259 in 2050. The Net Present Value of the Directive compared to BAU adds up to € 78,241 in 2030 and € 123,111.

6.4.2 Influence for operational workers

In total, 15 extra operational workers will enter the sector. The costs to obtain a Service Record Book are € 52.57 in the Netherlands. In order to award the professional experience gained in maritime, € 19.80 is charged. This brings the total costs to € 72.37. See Table 6.4 for the costs of Service Record Books in other European countries.



Table 6.4 Costs of a Service Record Book in countries other than the Netherlands (price level 2012)

Country	Factor	Costs SRB	Country	Factor	Costs SRB
Belgium	117%	€ 84.61	Latvia	40%	€ 84.61
Bulgaria	24%	€ 17.03	Lithuania	37%	€ 17.03
Denmark	124%	€ 90.02	Poland	42%	€ 90.02
Estonia	45%	€ 32.77	Portugal	60%	€ 32.77
Finland	103%	€ 74.28	Romania	27%	€ 74.28
France	105%	€ 75.94	Spain	72%	€ 75.94
Germany	98%	€ 70.96	Sweden	111%	€ 70.96
Italy	97%	€ 70.53	United Kingdom	89%	€ 70.53

Source: Panteia (2014), based on Eurostat CPI factors and data from SABNI (<http://www.sabni.nl>)

The extra costs for the extra inflow of operational workers will be € 924.54 per year. The Net Present Value of the measure adds up to - € 11,698 in 2030 and - € 18,406 in 2050.

6.5 Employment and job creation in inland navigation

There are no jobs created because of this measure, but existing gaps can be better filled as the employability of workers increases.

It must be noted that the number of workers from the maritime sector that consider a career in the IWT sector is of a lower order than the group of IWT workers that is affected by the mutual recognition as mentioned under Chapter 4 (Problem driver 1).

6.6 Improved job quality/ job attractiveness

Measures are aimed at levelling labour market barriers in the EU. This creates a basis for an improved free movement of personnel within the EU. Job quality and job attractiveness will improve, as also opportunities for advancement increase. Influence for boatmasters

Labour market

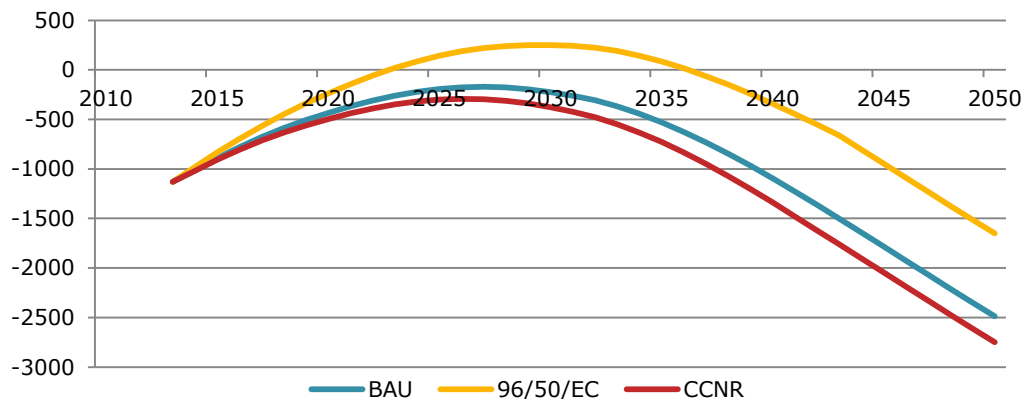
In general, applying the Directive 96/50 approach will result in an extra yearly inflow of 28¹⁰¹ workers compared to the situation as it is now. Applying the CCNR standards will diminish the lateral inflow with nine¹⁰² workers per year. The effects on the labour market for boatmasters are presented in Figure 6.1. It is estimated that workers from the Maritime sector will enter IWT at the age of 35. This will result in an IWT career lasting a maximum of 30 years.

¹⁰¹ Amount of CCNR workers from Table 6.2 for boatmasters and operational workers, multiplied by three. This is based on the Problem Definition, Box 4.3. Afterwards, the current amount of workers is subtracted.

¹⁰² Only one third of the current inflow from countries applying the Directive will remain if the CCNR approach is applied. This is based on the Problem Definition, Box 4.3.



Figure 6.1 Evaluation of the gap between demand and supply of boatmasters, depending on the approaches.



Source: Panteia (2014)

Figure 6.1 shows the effect of the measures on the labour market for boatmasters. It must be noted that applying the EU Directive 96/50/EC will have a positive influence on the labour market for boatmasters. Every year, 28 extra boatmasters will enter the sector and they will have a career in IWT lasting for 30 years. Compared to the BAU scenario, this scenario will result in 837 extra boatmasters in 2043. In the years after, the amount of new entrants as a result of the measure will be balanced by retirements of those who have entered just after the measure has been taken. The CCNR approach will reduce the workforce in IWT by 261 workers in the long term.

Wages

Boatmasters will benefit from higher salaries if the EU Directive 96/50 standards are applied instead of the CCNR standards. Now, an officer from the maritime sector will be awarded a maximum of two years professional experience, and thus (s)he will be qualified as an able crewman. If the approach from the 96/50/EC Directive is applied, the officer will be qualified as helmsman. Based on the Dutch wage tables of 2014, he will have a wage advantage of € 393.38 per year¹⁰³, including social security costs. One year later, the worker will be helmsman following the CCNR-standards and boatmaster according to the standards from the EU Directive 96/50. This will result in extra wages of € 8,436.62 per year, including social security costs.

The wages have been estimated for boatmasters from other countries using the factors as in Table 5.13. Multiplying these wage differences by the amount of boatmasters involved (Table 6.2) has resulted in the following results:

In general, applying the Directive will reduce the costs due to these inefficiencies by € 17,796 per year. If the CCNR approach is used, the extra costs as a result of inefficiencies will be € 9,923 per year.

Table 6.4 Net Present Value of the two approaches

Approach	2030	2050
EU Directive 96/50	€ 225,163	€ 354,292
CCNR approach	€ -125,554	€ -197,559

Source: Panteia (2014), based on Problem Definition report, NML 2012 and Guy Sulpice (2011)

¹⁰³ CAO loontabel binnenvaart: <http://www.cbrb.nl/-loontabel-1-januari-2014>

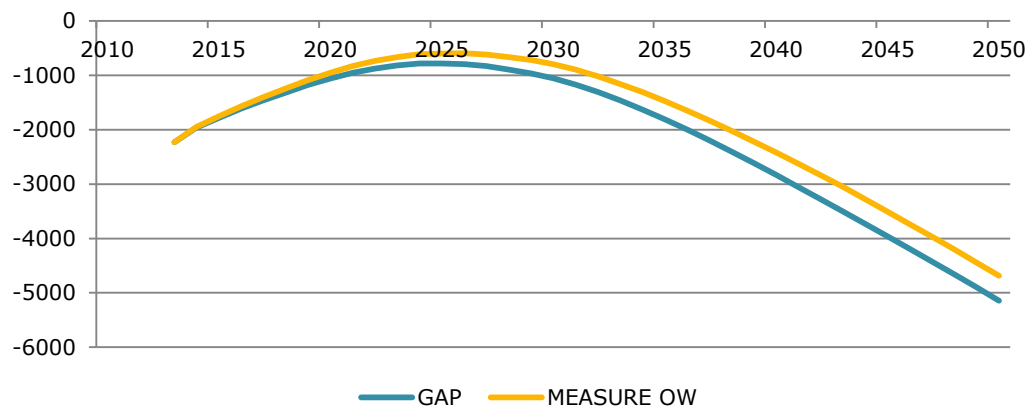


6.6.1 Effects on operational workers

Labour market

In general, applying the measure for operational workers approach will result in an extra yearly inflow of 15¹⁰⁴ workers compared to the situation as it is now. The effects on the labour market for boatmasters are presented in Figure 6.2. It is estimated that workers from the Maritime sector will enter IWT at the age of 35.

Figure 6.2 Evaluation of the gap between demand and supply of operational workers



Source: Panteia (2014)

Figure 6.2 shows the effect of the measure on the labour market for operational workers. It must be noted that applying the measure will have a positive influence on the labour market for operational workers. Every year, the workforce grows with 15 operational workers per year. Compared to the BAU scenario, this scenario will lead to 456 extra operational workers in 2043. Starting from that moment, the first operational workers that have benefited from the measure will retire as they have reached the age of 65 years.

Wages

Operational workers will benefit from higher salaries if the EU Directive 96/50 standards are applied instead of the CCNR standards. Now, deck crew from the maritime sector will be awarded a maximum of two years professional experience, and thus (s)he will be qualified as a deckhand. If the measure is applied, the deck worker will have its maritime experience count for 75%. This will mean that most workers will immediately qualify themselves as a boatman instead of a deckhand. Based on the Dutch wage tables of 2014, he will have a wage advantage of € 4.528,92 per year¹⁰⁵, including social security costs.

The wages have been estimated for boatmasters from other countries using the factors as in Table 5.13. Multiplying these wage differences by the amount of operational workers involved (Table 6.2) results into an increase of salaries of operational workers that switched from maritime by € 28,196 per year. The NPV of this measure will thus be € 356,745 for 2030 and € 561,336 for 2050.

¹⁰⁴ Amount of CCNR workers from Table 6.2 for boatmasters and operational workers, multiplied by three. This is based on the Problem Definition, Box 4.3. Afterwards, the current amount of workers is subtracted.

¹⁰⁵ CAO loontabel binnenvaart: <http://www.cbrb.nl/-loontabel-1-januari-2014>



6.6.2 Scores on other aspects of job quality/attractiveness

In order to create a basis for an estimate how measures contribute to job quality and job attractiveness, the scheme as in Table 4.2 is used. It is assumed that the different areas that determine job quality are relatively independent and that the more of these areas a measure scores, the higher the effect a measure has on job quality. In addition to this, it is important how many workers in IWT are influenced by this increased job quality over a certain period (here a period of one year has been taken). The combination of effect on job quality and the number of affected workers together determine the (qualitative) impact of a measure on job quality.

In the following Table 6.5, these score have been shown. Depending on these scores, a ranking of the measures has been determined. Generally, it can be said that once admitted to the IWT sector, there is no influence on the quality of the jobs as such. However, if experience gained at sea is taken better into account, this will make entering the IWT labour market more attractive for workers with a maritime background, opportunities for advancement increase. Table 6.4 shows the scores of the measures that have been investigated

Table 6.5: Scores on Job Quality for PD2 regarding difficulties with mutual recognition of relevant professional experience of workers from outside the sector

Measure	Job quality / attractiveness indicators											# Workers	Total score	
	Work autonomy	Physical working	Health implications	Risks	Pace of work and workload	Social working environment	Meaningfulness	On-the-job training	Participation	Opportunities for advancement	Formal training			Type of contract
For boatmasters, setting EU requirements in accordance with Directive meaning reducing required professional experience to 1 year (instead of 4 years)	+						+			+			28	+
For boatmasters, setting EU requirements in accordance with CCNR meaning reducing required professional experience to 2 year (instead of 4 years)	-						-			-			9	-
For other crew members, setting EU requirements, reducing required professional experience by taking into account 75% of the maritime experience gained.	+						+			+			15	+

Source: Panteia (2014)

6.7 Impact on SMEs

Small companies as well as larger companies may both benefit equally from the availability of workers from the maritime sector and their better qualifications.

6.8 Impact on third countries

Non-European nationals who are currently active in international maritime navigation can be affected by the measure. It has been reported that many workers with maritime experience from the Philippines were active in inland navigation during the past years.



7 Knowledge of specific situations (KSSs) may prevent boatmasters access to certain river stretches

7.1 Background

Certain specific stretches on European waterways have special safety relevant navigation conditions that require additional (special) knowledge and skills that are not obtained through general training and certification process. In this report, this is referred to as Knowledge of Specific Situations (KSS).

For vessels with boatmasters that do not fulfil the requirements regarding KSS, services can be provided so that also these vessels can pass stretches where KSS is required. Currently, this is common practice in particular on the Rhine and Danube. In order to be able to compare measures to BAU, a further in-depth treatment of BAU scenario is provided in section 7.2.

The following set of measures are proposed in order to optimize the possibilities for boatmasters to pass stretches where KSS is required:

- criteria for checking the necessity of any given KSS
- minimum standards of exams related to acquiring of KSS

It is difficult to assess these measures individually, as the benefits cannot be separated. Therefore, these measures are assessed as one package. In the sections below, the measures are further explained.

7.1.1 Criteria for checking the necessity of any given KSS

Navigating on maritime or coastal waters and rivers is of a different nature than navigating on lakes and canals. Member States and River Commissions can restrict access to waterways to holders of certificates attesting the possession of the knowledge of specific situations on these waterways. In order to set such access restrictions, one or a combination of the criteria below should be met:

The KSS requirements on any fairway should be adequate, efficient and proportional for addressing the criteria identified and ensuring high level of safety.

The following situations can justify the introduction of KSS:

1. Hydro morphology of the sector/river basin

This covers characteristics such as a maritime character of an inland waterway, sharp river bends, a narrow waterway, a rapidly changing water level between low and high water level, specific high water level conditions or various combinations of these characteristics.

2. Absence of appropriate marker systems on waterways which represents navigation risks due to their hydro morphological characteristics

- *Appropriate marker systems are systems which provide sufficient information on to the skipper in order to safely navigate and which can include the following elements:*
- *Buoys, beacons, light signals and notice marks,*
- *Fairway equipped with radar reflecting targets (radar reflectors on buoys and beacons, radar markings of the passage openings of bridges)*



- *Nautical information VHF radio service, Electronic waterways information system (ELWIS), Electronic waterways information system for Inland ECDIS.*

3. Presence of specific local traffic regulation justified by specific hydro-morphological features giving rise to safety concerns.

7.1.2 Minimum standards of exams related to acquiring of KSS

EU-wide harmonised provisions related to proving the possession of KSS by candidates should be introduced. The minimum exam requirements for acquiring and proving the possession of KSS should correspond to the relevance criteria and be proportionate to the safety risks at stake. The detailed standards for KKS requirements will be stipulated in a Commission delegated act. All Member States should be allowed to take/organise exams on KSS for all IWT sections and issue certificates attesting KSS. EU-wide harmonisation of minimum exam requirements with regard to KSS would ensure that all EU applicants can undergo non-discriminatory verification of any given KSS. An information obligation should exist between Member States in order to allow other member States to organise exams for all KSS in Europe.

7.2 Business as Usual

Fairways that require knowledge of the specific situation are summarized in Annex 2. Eurostat data¹⁰⁶ (iww_go_anavefl) has been analysed in order to determine the current costs of KSS to the IWT sector. There are situations where boatmasters sometimes need to transport goods to KSS-areas, while they do not possess the relevant KSS-certificate. In order to go there, pilots are hired.

Methodology

In order to determine the total costs of hiring temporary services in order to fulfil the requirements of KSS, we have used the following approach:

1. Eurostat data on transport per nationality of the vessel (iww_go_anavefl) is analysed, taking such a level of detail (Country level, NUTS 1, or NUTS 2) that transport to regions affected by KSS can be isolated¹⁰⁷.
2. Based on average vessel loading capacities and a load factor of 70%, the amount of trips involved is calculated.
3. Based on Expert Opinions, estimations will be made on the percentage of boatmasters per country having KSS on the relevant stretches, i.e. the Rhine, Danube, Elbe, Rhône, Seine and Odra¹⁰⁸. This way, the amount of affected trips is calculated by taking into account transported tonnage and average vessel sizes.
4. Based on the origin and destination, the amount of distance for which KSS is required can be calculated. Assuming an average vessel speed of 12 km/h, the amount of time spent on KSS-rivers, is calculated.
5. Based on the amount of time spent on KSS-rivers and the river stretch involved, an estimation can be made of the costs for hiring temporary services.

Regions selected

In general, the geographical level of detail is country level for the Netherlands, Belgium, Poland, Austria, Slovakia, Hungary, Croatia, Serbia, Romania, Bulgaria and Ukraine. In all of these countries, at maximum of one river that requires KSS can be found.

¹⁰⁶ <http://appsso.eurostat.ec.europa.eu/nui/show.do?query>

¹⁰⁷ For France, NUTS 2 has been used to isolate Normandy. For Germany, NUTS 1 level has been used.

¹⁰⁸ The CCNR was not able to provide information on the amount of Rhine Patents issued per nationality.



For Germany, a detailed view is provided on level of the Länder. This is done, as there are four rivers that require KSS on German territory: Rhine, Danube, Elbe and Odra. In France, the Maritime Seine (downstream of Rouen) and the Rhône estuary require KSS¹⁰⁹. In order to isolate the Maritime Seine, NUTS 2 have been used.

Average vessel load capacity per country

Table 7.1 shows the average load capacity per country.

Table 7.1 Average vessel load capacity per country

Country	Load capacity	Country	Load capacity
Austria	725	Luxembourg	847
Belgium	943	Netherlands	1,377
Bulgaria	1,136	Poland	519
Croatia	580	Romania	1,007
Czech Republic	587	Serbia	908
France	850	Slovakia	754
Germany	1,170	Switzerland	1,698
Hungary	1,311	Ukraine	2,105

Source: CCNR (2012) and Danube Commission (2012)

7.2.1 Percentage of boatmasters having KSS per nationality

For every river stretch, an estimation was made of the amount of boatmasters sailing a KSS stretch holding a certificate permitting access to that stretch to be equal to the values in Table 7.2. Others are expected to use pilotage services.

Situation in France

Information retrieved by the French Ministry of Ecology, Sustainable Development and Energy indicates a total number of KSS licenses (*licences patron pilote*) for the Gulf of Fos as 40 and for the Seine basin as 180. In 2011 and 2012, a total number of 13 licenses have been issued out of a total of 16 candidates¹¹⁰. Another Ministerial report indicates a yearly number of issued licenses of 15 for the Seine basin¹¹¹.

For the Rhone basin, recent figures are used from a report of 2012¹¹². Here it is stated that 59 captive self-propelled vessels are operating in this river basin¹¹³. Furthermore, less than ten Freycinet¹¹⁴ vessels are reported to operate in the basin on a regular basis. The amount of Freycinet vessels operating on an occasional basis in the Rhone basin, for transporting goods to the north of France, is reported as 78 vessels. These Freycinet vessels are exempted of having pilots (See Annex 1). On top of this, there are 73 barges reported that will have to be pushed. Multiple sources^{115,116} from various time frames report 16 pusher vessels in the Rhône – Saône basin. If sixteen pushers are added to the total of 59 vessels, a total of 75 captive vessels are active in the Rhône – Saône basin. Fourty vessels are authorised to sail on the Gulf of Fos (53%).

¹⁰⁹ The border section of the Rhine also requires KSS, as well as the Gironde river. On this river, only Airbus and the CFT are active with two inland navigation vessels. Therefore, the Gironde is not taken into account in this analysis.

¹¹⁰ Presentation by Ministère de l'Écologie, du Développement durable et de l'Énergie on 14/02/2013, Licence Patron Pilote et Pilotage sur le secteur de Rouen.

¹¹¹ Conseil général de l'Environnement et de Développement durable (2010), Report n°- 007031-02: Missions régaliennes des services de navigation.

¹¹² Niérat, P. (2012), La Production fluviale sur la bassin Rhône – Saône:

¹¹³ Vessels are captive, as their dimensions restrict access to the Freycinet networks that interconnects the Rhône – Saône river basin to the Seine basin and the Rhine basin.

¹¹⁴ A Freycinet vessel has the dimensions of 38.50 metres long and a maximum of 5.10 metres wide.

¹¹⁵ Vagus – Vagrant: A French forum for inland navigation in the past and today, Liste des Pousseurs du bassin du Rhône: <http://www.vagus-vagrant.fr/forum/viewtopic.php?f=2183&t=10240>

¹¹⁶ VNF (2005), La flotte fluviale française de marchandises en activité en 2004:



In the Seine basin, a captive fleet of 112 self-propelled vessels is reported. Also, 60 push barges are indicated (172 vessels in that case)¹¹⁷. Also, 530 Freycinet barges are reported sailing in this river basin. Most of them are involved in traffic relations with the Netherlands and Belgium, using the existing Canal du Nord and Canal de Saint-Quentin. 1/3rd of the Freycinet vessels in the Seine basin sail the Maritime Seine on a regular basis. In total, a number of 350 self-propelled cargo vessels will remain of which 180 have the license for the Maritime Seine river. For passenger vessels (n=20) and vessels transporting hazardous cargoes, a maritime pilot is required; a KSS certificate for the captain will not be recognised for these vessels¹¹⁸. In total, about 45% of the boatmasters in the Seine basin have a KSS license for the Maritime Seine.

Apart from the Rhône – Saône, Seine and Rhine basin, inland navigation is possible on the Loire and Gironde river. Both rivers have KSS obligations, as referred to in Annex 1. However, inland navigation on these rivers is limited. For the Gironde river, this is illustrated in box 3.

Box 3: Navigation on the Gironde river in France

There are about twenty pilots in Bordeaux. On a monthly basis, about 120 vessels are guided on the Gironde River. [...] There is no inland navigation on the Gironde anymore, apart from the *Lyonnais*, a self-propelled tanker and some barges used for gravel transport. The Freycinet vessels that used to transport corn from the Canal latéral à la Garonne to the port of Bassens stopped doing so. "Terre du Sud [shipper of corn] has still plenty of work available for inland vessels, but they cannot charter any vessel", says the captain of the Brielle [an inland vessel transporting parts of Airbus airplanes from Langon to Pauillac]. "The VNF disrupted inland navigation due to a lack of fairway maintenance. If you lose your screw three times due to logs, you will get problems with the insurance".

Source: <http://www.picaro.nl/riverhoppin/#garonne>

For both the Seine and the Rhône river, about 50% of the vessels do possess a KSS certificate. As boatmasters with a KSS license will sail the stretches more than boatmasters without, a ratio of 3:1 will be used. This means that for every three trips by a boatmaster with a KSS license, one will be done by a boatmaster without the license.

Table 7.2 Percentage of boatmasters per country that holds a certificate of local knowledge per river basin

Nationality	Rhine	Danube	Elbe	Rhône	Seine	Odra
Slovakia	5%	100%	0%	0%	0%	0%
Austria	5%	100%	0%	0%	0%	0%
Bulgaria	5%	100%	0%	0%	0%	0%
Croatia	5%	100%	0%	0%	0%	0%
Romania	5%	100%	0%	0%	0%	0%
Serbia	5%	100%	0%	0%	0%	0%
Ukraine	5%	100%	0%	0%	0%	0%
France	95%	10%	0%	75%	75%	0%
Belgium	95%	10%	0%	0%	5%	0%
Czech Republic	5%	0%	100%	0%	0%	5%
Germany	95%	50%	90%	0%	0%	90%
Luxembourg	95%	5%	10%	0%	0%	0%
Netherlands	95%	10%	10%	0%	5%	0%
Poland	5%	0%	80%	0%	0%	100%
Switzerland	95%	0%	0%	0%	0%	0%

Source: Panteia Expert Estimation (2014)

¹¹⁷ AESN (2003), Navigation commerciale et navigation de plaisance en Seine-Normandie

¹¹⁸ Conseil général de l'Environnement et de Développement durable (2010), Report n°- 007031-02: Missions régaliennes des services de navigation.

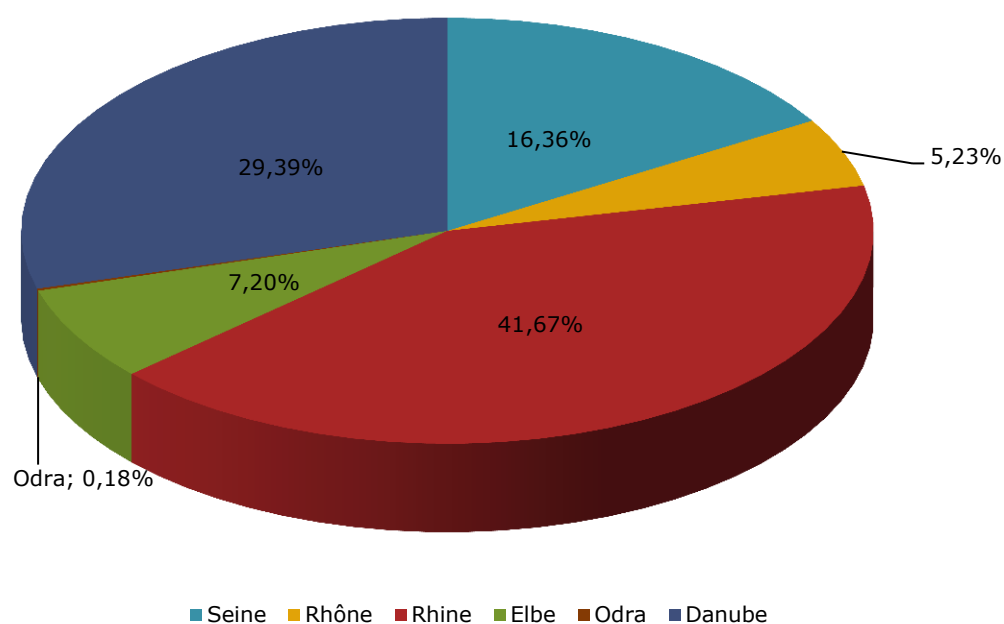


7.2.2 Tonnage affected by KSS

In terms of tonnage moved, based on the Eurostat data, it is calculated that 22,681,500 tons are affected by KSS. This equals 4.3% of the total tonnage transported in EU-28 (2011). See Figure 7.1 for the percentage breakdown over the relevant river basins. It should be noted that the major contributors are the Rhine (41.7%) and Danube river (29.4%), as well as French rivers (Seine and Rhone) with 21.6% of the total tonnage affected by KSS requirements.

On the Odra and the Elbe rivers, less tonnage is affected. This is mainly due to a lack of transport on these rivers. For the Odra river, the parallel canal provides a good entrance with reliable fairway depths to the port of Szczecin. For the Elbe, there is little transport between Schärnebeck (Germany) and Schöna (German – Czech border), due to unreliable water conditions. However, the stretch on the Elbe between the Elbe – Seitenkanal and Geesthacht lock (40 kilometres) has got heavy traffic, of over 7 million tonnes a year which are subject to KSS.

Figure 7.1 Percentage breakdown of tonnage affected by KSS in 2011.



Source: Panteia (2014), based on Eurostat

The regional breakdown of the tonnage affected by KSS in 2011 is presented in Figure 7.2. It can be observed that tonnage transported to the Netherlands, Nordrhein-Westfalen, Bayern and Normandy are affected most in terms of absolute numbers. The percentage of the total tonnage transported to a region is presented in Figure 7.3. This sheds a different light on this topic: now transport to Mecklenburg-Vorpommern, Normandy, Bayern and the Provence are affected the most. Also the Danube countries are affected. Although the absolute numbers of tonnage affected to the Netherlands, Nordrhein-Westfalen are high, the relative numbers (as a percentage of the total transport) are low for these regions.

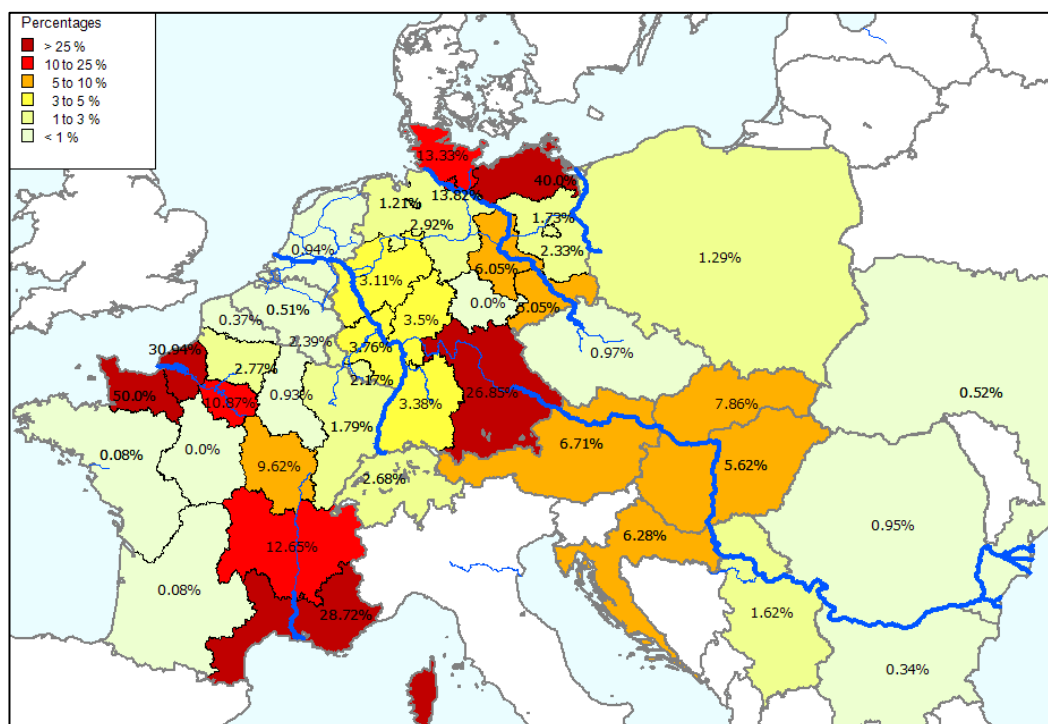


Tonnage affected

- 2,000,000 to 5,000,000
- 1,000,000 to 2,000,000
- 500,000 to 1,000,000
- 200,000 to 500,000
- 50,000 to 200,000
- 5,000 to 50,000
- 0 to 5,000

Map showing the tonnage of goods affected by the 2004 tsunami in Europe. The map is color-coded according to the tonnage affected, with a legend in the top left corner. The highest tonnage affected (2,000,000 to 5,000,000) is shown in dark red, while the lowest (0 to 5,000) is shown in white. The map shows that the highest tonnage affected was in the Balkans, particularly in Greece and Bulgaria, with values ranging from 1,204,050 to 2,944,250. Other significant areas include Turkey (1,204,050), Italy (1,001,700), and the UK (1,001,700). The map also shows that the tonnage affected was significantly higher in the Balkans and Turkey compared to other regions, such as the UK and France, which had much lower tonnage affected (e.g., 1,500 in the UK, 100 in France).

Figure 7.3 Regional breakdown of the percentage of total tonnage affected by KSS in 2011.



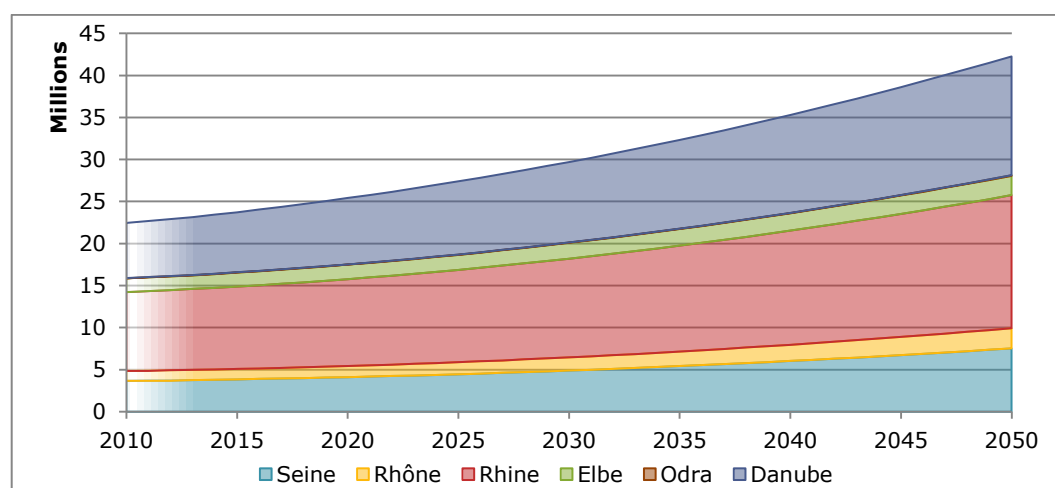
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Future developments

Based upon forecasts of future tonnage transported in IWT by NEA (2011)¹¹⁹, the tonnage affected by KSS is expected to increase. For 2011, 22,681,500 tonnes are transported. This figure is expected to increase to 25,419,280 tonnes in 2020, to 29,714,732 tonnes in 2030 and up to 42,288,679 tonnes in 2050. As can be observed from Figure 7.4, the difference in tonnage affected between the Rhine corridor and the Danube is expected to decrease slightly over time.

Figure 7.4 Evolution of the amount of tonnes affected by KSS over time



Source: Panteia (2014), based on data from NEA et al. (2011)

7.2.3 (Tonne)kilometres affected by KSS

In order to make the translation from tonnes to tonne kilometres, we should know about the amount of kilometres that are subjected to KSS per trip. For the river basins involved, we have used the following estimations:

- Rhine: 75 kilometres¹²⁰;
- Danube; See Table 7.3, as the Danube comprises 1,780 km of KSS-stretches
- Seine: 75 kilometres;
- Odra: 80 kilometres;
- Rhône: 30 kilometres;
- Elbe: 40 - 270 kilometres.

The amount of kilometres on the Rhine with KSS is equal to 523,4 kilometres. Exams comprise seven stretches, thus each stretch covers about 75 kilometres¹²¹. On the Seine, 95 kilometres are subjected to KSS. However, the Tancarville channel shortens the route to Le Havre by 20 kilometres and thus boatmasters need to sail 75 kilometres on KSS stretches. For the Odra, the 80 kilometres between Szczecin and Hohensaaten lock is taken as a proxy. For the Rhône, 30 kilometres is taken. This is equal to the distance between Bassin du Gloria and Barcarin Lock. For the Danube, no general estimations can be given as it is a river with 2,167 kilometres subjected to KSS.

¹¹⁹ NEA et. al, 2011: Medium and long term perspectives of Inland Waterway Transport in the European Union.

¹²⁰ Although the Rhine covers 523 kilometres subjected to KSS, most boatmasters have a certificate that permits access to parts of this total stretch. Most boatmasters needing pilotage, miss out one stretch (most likely being Mannheim – Iffezheim). Therefore, 75 kilometres have been used.

¹²¹ In practice, most pilotage is needed on the Mannheim – Iffezheim stretch.



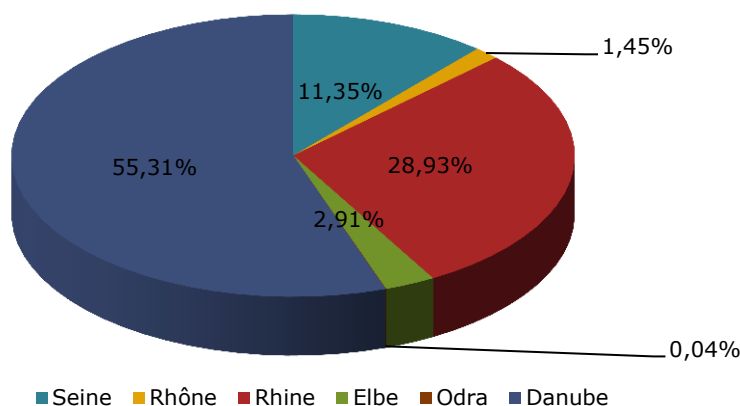
Table 7.3 Amount of kilometres per trip subjected to KSS on the Danube, depending on origin and destination

	DE	AT	SK	HU	HR	RS	RO	BG	UA
Germany	80	80	218	389	694	775	1274	1284	1767
Austria		84	138	309	614	695	1194	1204	1687
Slovakia			42	171	476	557	1056	1066	1549
Hungary				334	305	386	885	895	1378
Croatia					100	81	580	590	1073
Serbia						184	499	509	992
Romania							798	795	493
Bulgaria								310	490
Ukraine									127

Source: Inland barge Voyage Planner from Periskal and PBV, available at <http://pbv.periskal.com>. Adjustments have been made based on KSS-data from Annex 2.

In total, it is calculated that 2,450,740,275 tonne kilometres are subjected to KSS¹²². This equals 1,8% of the total transport performance in Europe. Compared to Figure 7.1, the Danube now has the largest share with over 55% of the total transport performance. This is due to the far longer trip length on the Danube; pilotage is sometimes needed for more than thousand kilometres.

Figure 7.5 Percentage breakdown of transport performance affected by KSS in 2011



Source: Panteia (2014), based on Eurostat

Future developments

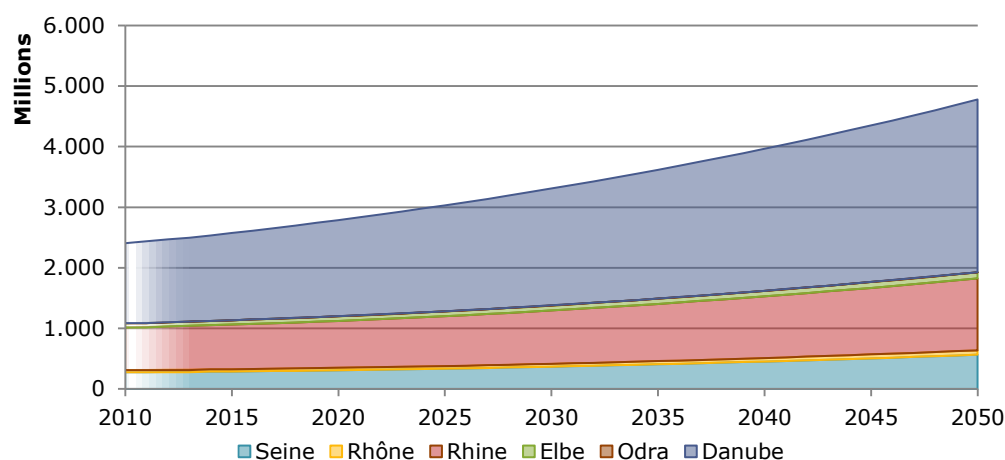
In the future, the amount of tonne kilometres affected by KSS is expected to increase. For 2011, 2,436 million tonne kilometres are affected. This figure is expected to increase to 2,787 in 2020, 3,307 in 2030 and up to 4,776 million tonne kilometres in 2050¹²³. It should be noted that the share of the Danube is expected to gradually increase from 55.3% in 2011 up to 59.9% in 2050.

¹²² Multiplying the amount of tonnage affected by the amount of kilometres involved from Table 7.3 and the estimations on the previous page.

¹²³ The prospected developments of IWT transport from NEA et al. (2011) have been applied on the relevant corridors/rivers to determine the amount of tonne kilometres affected in the future.



Figure 7.6 Evolution of the transport performance affected by KSS over time



Source: Panteia (2014)

7.2.4 Costs of hiring temporary services

Boatmasters can hire pilots in order to sail stretches where KSS is required if they do not possess a KSS certificate themselves. Estimations on the amount of boatmaster that sail on KSS stretches that possess a KSS certificate are presented in Table 7.2. Costs of pilotage vary among Europe. The costs of pilotage are presented in Table 7.4.

Table 7.4 Costs of pilotage per river basin (exclusive of VAT)

River basin	Costs per hour	Additional information
Rhine	€ 40.18	https://www.elwis.de/Schifffahrtsrecht/Verzeichnis-Rechtsverordnungen-Gesetze/Entgelte-Binnenlotsen.pdf
Danube	€ 19.37	http://www.bld-regensburg.de/lotse.html
Elbe	€ 40.18	http://bshl.de/downloads/lvelbe.pdf
Rhône	€ 55.59	http://www.marseille-port.fr/fr/Content/Documents/2013/04/zmfr_prefectural_order.pdf
Seine	€ 55.59	http://www.pilote-seine.fr/
Odra	€ 26.54	http://www.zegluga.wroclaw.pl/

Source: Panteia 2014

These costs are derived from the Dutch wage tables and the comparison of personnel costs in Inland Navigation from the Eurostat tables 'sbs_na_1a_se_r2'. Due to the irregularity of these services and overhead, a surcharge of 50% is accumulated. For river basins spanning more than one country, a weighted average is used for the countries involved, based on the amount of boatmasters per country¹²⁴ and the division of workers per country per corridor¹²⁵.

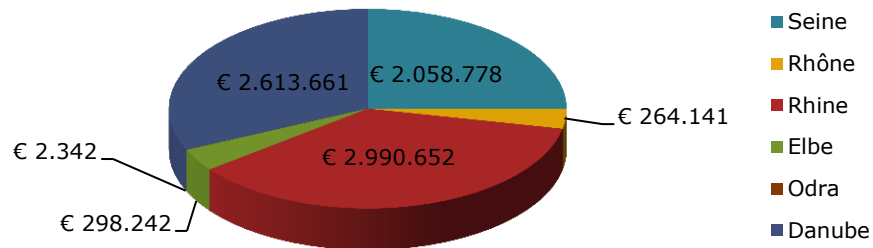
Total costs of KSS are determined by calculating the amount of voyages needed (based on the total transport performance and the average vessel capacity as mentioned in Table 7.1) and the amount of time a trip takes. An average speed of 12 kilometres per hour is assumed on KSS-stretches. With these numbers, the total costs for the IWT sector can be determined as of € 8,256,457. A breakdown of these costs for the river basins is presented in Figure 7.5.

¹²⁴ Panteia et al. (2014), Contribution to the problem definition in the context of the preparation of the Impact Assessment regarding the recognition of professional qualifications in inland navigation, Table 2.1

¹²⁵ Ibid, Annex 7.



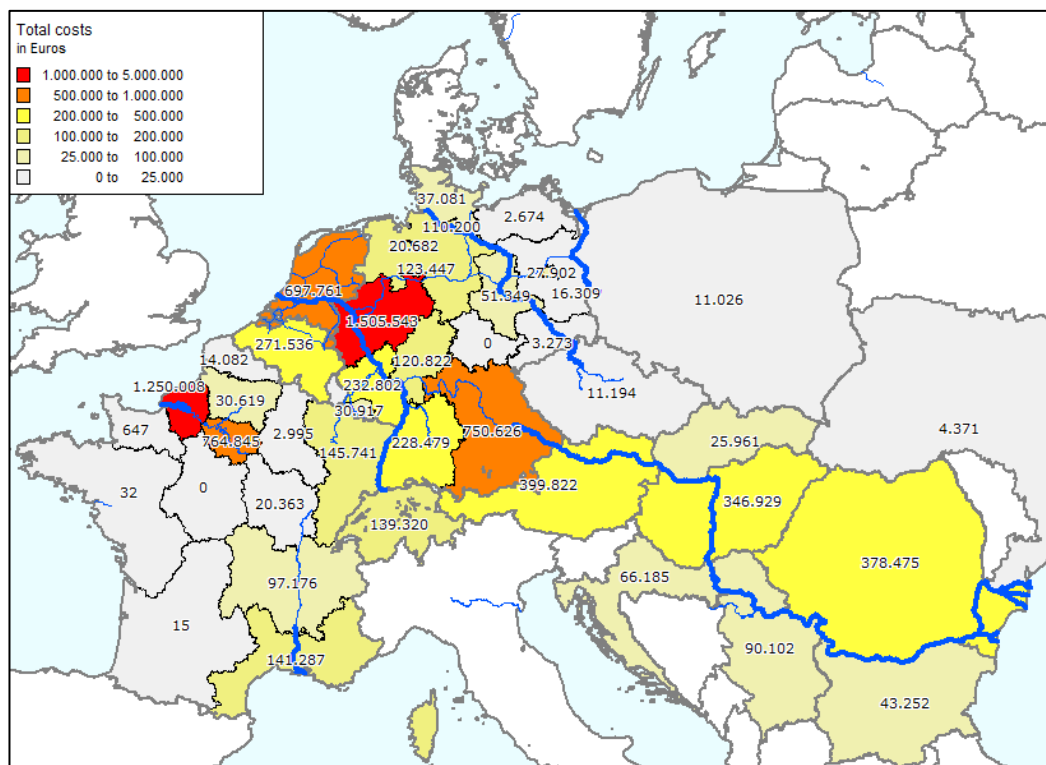
Figure 7.7 Breakdown of costs per river basin in 2011.



Source: Panteia (2014)

From Figure 7.7, it is seen that the Rhine, Seine and Danube are the main contributors to the extra costs for pilotage. In total, € 2,613,661 of extra costs are made on the Danube due to pilotage. On the Rhine, this figure equals € 2,990,652. Also the Maritime Seine has got a large contribution to pilotage costs: € 2,058,778¹²⁶. Extra costs due to pilotage are less in the other river basins: from € 298,242 per year on the Elbe to € 2,342 on the Odra each year. Figure 7.8 presents the absolute number of the extra costs per region due to KSS. It can be noticed that Normandy, Nordrhein-Westfalen and Bayern are affected most, with extra transport costs due to KSS exceeding € 1 million. The Netherlands, Austria and Hungary are affected too.

Figure 7.8 Regional breakdown of the extra transport costs to a region due to KSS in 2011.



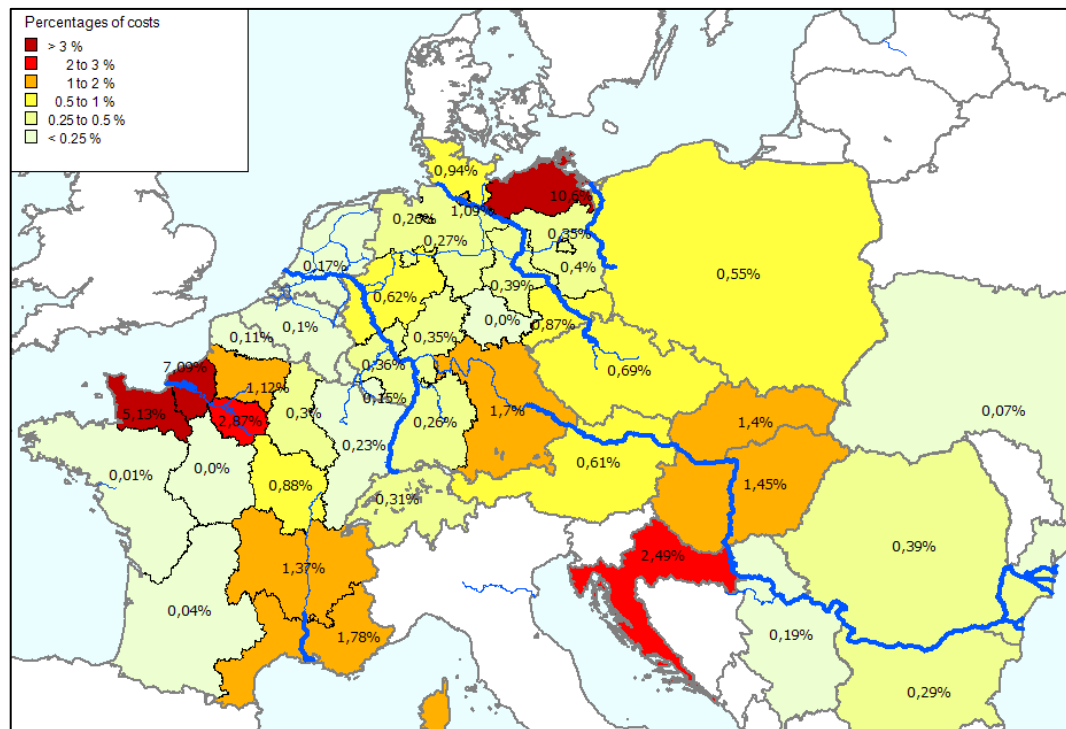
Source: Panteia (2014)

¹²⁶ The Seine – Scheldt link might increase traffic on the Maritime Seine even further. Currently, total costs for pilotage, including maritime vessels, already exceeds € 10 million per year in France.



However, the Netherlands and Nordrhein-Westfalen are the major origins and destinations of inland water freight transport. It is therefore not surprising that these regions are affected most in terms of absolute numbers. By using a generic formula¹²⁷ in order to calculate the total transport costs to a region, the total effects of KSS can be determined. The transport performance to a country/region is presented in Annex 4. In general, the turnover of European inland water freight transport companies is estimated at € 1.7 billion. The regional breakdown of the percentage of transport costs due to KSS compared to the total transport costs to a region is presented in Figure 7.9.

Figure 7.9 Regional breakdown of the percentage of transport costs due to KSS compared to the total transport costs in 2011.



Source: Panteia (2014)

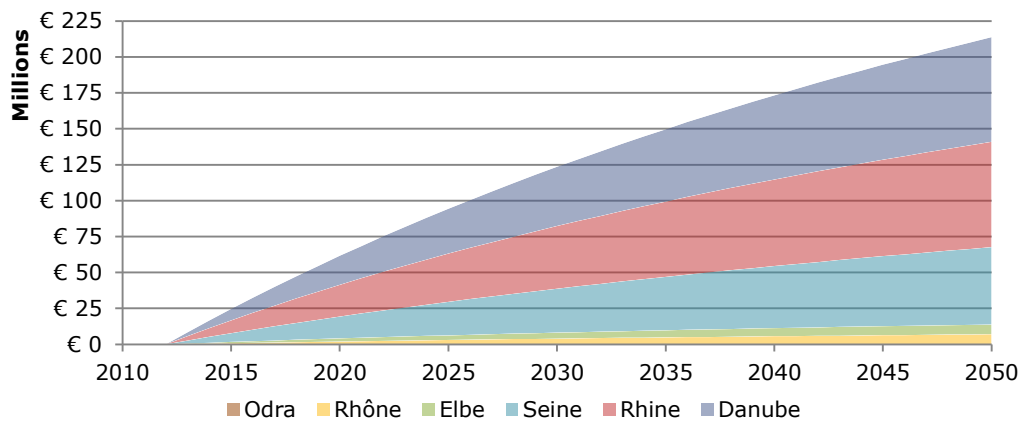
It must be noted that Figure 7.9 differs from Figure 7.8. Now, Mecklenburg-Vorpommern, Normandy, Île-de-France and Croatia are affected most in terms of extra transport costs. These costs contribute up to a maximum of 10% of the total transport costs. Austria, Hungary and the Provence region are affected to a lesser extent. The reason for Bayern and Slovakia being affected more than Austria, is the larger share of import relations with Western-Europe as compared to Austria.

Future developments

As the amount of cargo transported that is subjected to KSS doubles in the period 2011 – 2050, the Net Present Value increases fast as well. In 2030, the sector will have paid € 123,570,239 for pilotage. In 2050, this figure will be € 213,741,801. See Figure 7.10 for a breakdown of the costs per river basin.

¹²⁷ Based on an analysis of over 40,000 trips in the period 2009-2014, we have determined the transport costs per tonne kilometre to be € 0.0202 with a standard deviation of € 0.0785. Based on the fact that transport of agricultural products is overrepresented within our database and not all transport is carried out by Dutch vessels, we have assumed the average transport costs for European vessels to be € 0.012611 per tonkm.

Figure 7.10 Accumulated Net Present Value of Costs due to KSS per river basin and total, base year 2013



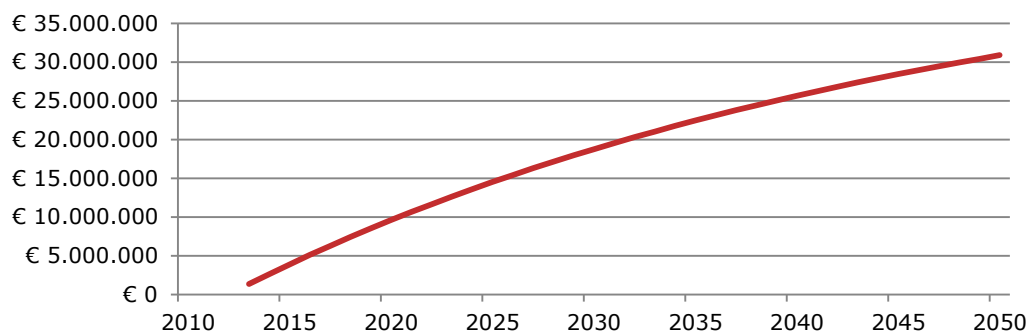
Source: Panteia (2014)

7.2.5 Safety

The safety aspect is the main reason for MS and River Commissions for setting KSS. In order to make calculations on this safety aspect, it is assumed boatmasters without KSS to have an accident frequency that is a factor ten¹²⁸ higher than boatmasters that do have a KSS on the certain stretch. With 1,151 accidents¹²⁹ happening every year in Europe, and 154,878 million tonne kilometres transported per year and an average load capacity per barge of 1,052 tonnes, the accident frequency per million kilometre can be determined as 7.819 accidents per million kilometres. For boatmasters without KSS on a KSS-stretch, this accident frequency is 78.19 accidents per million vessel kilometres. With these figures, as much as 33 accidents will be prevented in 2014. This number will increase to 39 in 2030 and 49 for 2050.

With an average accident having a cost of € 40,357¹³⁰, the Net Present Value of the safety benefits of KSS can be calculated. See Figure 7.11.

Figure 7.11 Net Present Value of safety benefits of KSS



Source: Panteia (2014)

¹²⁸ This is an assumptions that only aims to express that missing KSS may result in an accident risk that is considerably higher.

¹²⁹ Navigation related accidents only. KSS do not have influence on work related accidents

¹³⁰ Panteia et al. (2014), Contribution to the problem definition in the context of the preparation of the Impact Assessment regarding the recognition of professional qualifications in inland navigation.



7.3 Investment costs

7.3.1 Criteria for checking the necessity of any given KSS

Per KSS stretch, a risk assessment will be required in order to motivate the requirements. These risk assessments will require an analysis of the local situation (as mentioned above) and available accident statistics. Additional interviews with boatmasters may shed light on accident causes or near-misses. Based on the analyses, proper measures with regards to KSS must be proposed in order to reduce the risk to an acceptable level. This risk level should be set beforehand in order to arrive at measures that are comparable and proportional. In this stage it is difficult to indicate the costs incurred and to the consultant's knowledge, no usable research is available concerning the evaluation of safety risks on KSS-requiring fairways and comparable fairways that do not require KSS.

7.3.2 Minimum standards of exams related to acquiring of KSS

Minimum standards of exams should enable all Member States to take/organise exams on KSS for all IWT sections and issue certificates attesting KSS. It is assumed that in setting the minimum standards themselves, no costs are incurred. Compared to BAU, for Member States that organise their own exams it will be cost efficient if the exams are translated from the country where the KSS are in force. This will require translation costs. Further, compared to BAU, organisational costs will be incurred in order to carry out the exams.

On the other hand, costs will be saved because boatmasters do not need to master the language of the country where the KSS are in force. Furthermore, they save on travel time and costs to and from the competent authority for taking an exam.

It is assumed that all boatmasters wish to take an exam in their country of origin. The following Table 7.5 shows the amount of boatmasters per country that derive benefits from having their exams in the country of origin. The values are derived from our KSS-model, that includes data on regional transport flows from Eurostat.

Table 7.5 Amount of boatmasters per country derive benefits from having exams in their country of origin

Nationality	Seine	Rhône	Rhine	Elbe	Odra	Danube
Slovakia	-	0	3	1	-	-
Austria	-	-	4	-	-	-
Bulgaria	-	-	1	-	-	-
Croatia	-	-	-	-	-	-
Romania	-	-	5	-	-	-
France	-	-	-	0	-	19
Belgium	44	9	-	6	0	34
Czech Republic	0	-	42	-	1	1
Germany	6	0	-	-	-	-
Netherlands	14	8	0	28	1	199
Poland	0	-	87	10	-	1
Switzerland	0	-	-	2	-	1

Source: Panteia (2014)

It is assumed that the information obligation does not incur costs. However, it is a prerequisite for other Member States to be able to organise their own exams.



7.4 Safety

There is a strong link between KSS and safety. After all, this is the reason why KSS exist. However, it is very complex to establish a quantitative connection between KSS and safety. As a prerequisite, statistics need to be available that describe the number of accidents on a river stretch with and without KSS. These statistics are not available. Also a comparison between different rivers is difficult, as KSS concern specific river stretches, each with their own navigational characteristics. Applying a risk assessment in order to set proportional requirements for KSS will make better use of the available resources. At this point, it is not possible to know the outcomes of the risk assessments. Generally, it could be assumed that stretches with very strict requirements compared to all others, may suffer from disproportional demands. An example here is the Gironde river in France, where 36 voyages are required for a B license¹³¹. Risk assessment studies would be an objective way in order to align KSS requirements. Ahead of the results of such a risk assessment, the following specific characteristics of KSS on certain river stretches in Europe are particularly noteworthy:

- KSS on the Danube seems less stringent, however, boatmasters of Danube countries will acquire all the KSS of the total navigable Danube (2,411 km and 1,767 km with KSS) upon successfully passing their boatmaster exam. Only theoretical knowledge of the situations is required unless experience voyages are mandatory, as on the Straubing – Vilshofen stretch and the Austrian stretches.
- On the French KSS sections, professional experience should be made again in order to renew the license (once every year on the Loire and Rhône, once every three years on the Maritime Seine and Gironde). Furthermore, periodic medical examinations are required in order to renew the license.
- Passenger vessels or vessels transporting hazardous cargoes are not eligible for a KSS license on French waterways. They all need a maritime pilot.
- In the process of mutual recognition of boatmaster licenses from Poland, Slovakia, Romania and Bulgaria, the CCNR negotiated access without any KSS limitations on these countries. This means holders of the Rhine Patent can sail on the Odra and certain parts of the Danube without being subjected to KSS. On the other hand, boatmasters from the countries concerned still need to prove KSS on the Rhine.
- However, on the Austrian, Hungarian, Serbian and Croatian sections of the Danube, holders of the Rhine Patent are still subjected to KSS.

Lastly, the use of simulators may contribute to the safety, as in the case of simulators all kinds of weather conditions or emergencies can be simulated that generally do not occur during a practical exam on a river. It moreover gives the opportunity to practice on KSS sections that have a limited amount of pilots available due to aging, such as the Upper-Weser river and the Maritime Seine¹³². For the Weser example, see box 4.

Box 4: Pilotage on the Weser river¹³³ (2010)

HEMELN - Next weekend, machine factory Richter will transport the first of 17 machines of this year from Hann. Münden. Pilot Heinz Guicking will be part of the team.

The pilot will take the helm from the vessels captain at the start of the journey, as the captain of the vessels does not have the Weser license. Only with a KSS license, one will be allowed to sail the 205.45 kilometre stretch from Minden to Hann. Münden. Mr. Guicking, aged 63 years, is the youngest out the three pilots with a Weser license. There is a shortage of young people in this job: a problem that must be solved in order to further boost the Weser ports and increasing transport.

Source: <http://www.hna.de/lokales/hann-muenden/fluss-sein-revier-596168.html>

¹³¹ Arrête du 03/02/2011 relatif a pilotage des bateaux, convois et autres engins flottants fluviaux qui effectuant une navigation dans les limites de la station de pilotage maritime de la Gironde.

¹³² Conseil general de l'Environnement et de Développement durable (2010), Report n°- 007031-02: Missions régaliennes des services de navigation.

¹³³ The German authorities (2014) report a total of 20 boatmasters under 65 years old for the Upper-Weser river with a KSS license for the whole stretch or part of it.



Possibility to use of simulators in examination

Simulators are considered as innovative tools which can support and accelerate nautical education, as various tasks and extreme situations can be trained and better analysed at high frequency and free of risk. Furthermore, with ship handling simulators nautical personnel can be qualified in a faster, safer and hence, more efficient way than in real time. Thereby, simulators can contribute e.g. to an increased safety level, to an energy efficient navigation, to the establishment of harmonised European education and qualification standards, to more attractive job profiles and to the reduction of the shortage of qualified nautical personnel.

However, contrary to other professions like aviation pilots or marine officers, simulators are up to now not generally used in all countries as training tool for inland waterway transport nautical staff. Due to the limited demand by education institutes, usually few simulators adapted to the special needs of inland navigation exist; maritime ship handling simulators are hardly suitable for training inland waterway transport-nautical staff, as hydrodynamics are rather complex in narrow and shallow inland waters and the bridge size and layout is different from those on seagoing ships. Accordingly, the development and certification of dedicated inland waterway transport ship handling simulators is considered as a promising approach to efficiently support and speed up existing education and training concepts. Targeted research activities are required to close this gap.

There are costs incurred for taking this measure compared to BAU. In case of the use of simulators, training institutes that are willing to possess a simulator need to purchase one. These are expensive as there is no defined ship-handling simulator yet. The technical standards will most probably be based on the functional standards as discussed during a round table organised by the CCNR. STC has developed their own ship-handling simulators, at an average cost per simulator of a million euro. Prices may vary, according to functional and technical standards offered (mathematical modelling, visual databases and the degrees of freedom).¹³⁴

7.5 Administrative costs

Administrative costs could be saved when candidates would be allowed to have their exam in their country of origin. In the current situation, they are required to travel to a location in the country where they would like to have their KSS exam for a certain river stretch in that country. This requires costs in terms of travel time and costs spent. Further, when the language of the exam is not the same as the native language of the candidate, it is assumed that a language course will be needed in order for a candidate to properly prepare for the exam. In order to make calculations, the dynamic labour market model has been combined with an allocation to the various river stretches where there are KSS (Rhine, Seine, Rhône, Danube, Elbe and Odra), leading to the evolution of new entrants that would need to take KSS exams. Cost estimations for travel costs, costs of time spent and language courses are made. Where needed, estimations have been adjusted using appropriate Eurostat CPIs for various countries.

Methodology

In order to determine the administrative costs of the measure, the following approach is used:

1. Based upon the distribution rate of boatmasters per corridor, the amount of boatmasters that require KSS-certificates can be estimated;

¹³⁴ Information received from STC.



2. Based upon current car costs for boatmasters to exam institutes, travel expenses are estimated, using CPI factors on travelling costs for the various countries;
3. Based upon current wage, travel expenses in terms of time spent are estimated, using CPI factors on wage for the respective countries;
4. Based upon the national language, it is estimated if a language course is needed for a boatmaster;
5. By summing up the car costs, the travel expenses in terms of time and the language courses, the total investment of a boatmaster is calculated¹³⁵;
6. By determining traveling distances and time to the local institute, estimations are made on the savings.
7. This is done for all countries in the labour demand/supply model and for all fairways with KSS;

7.5.1 Amount of boatmasters affected

The amount of boatmasters per country that needs KSS can be determined by using the distribution rate of boatmasters per corridor. This distribution rate has been used to allocate workers among the different corridors in the labour demand/supply models. See Table 7.6 for the distribution of workers over corridors¹³⁶.

Table 7.6 Allocation of workers over corridors

	<i>Rhine</i>	<i>North-South</i>	<i>Danube</i>	<i>East-West</i>
Netherlands	74%	18%	1%	7%
Belgium	27%	71%	0%	2%
Germany	52%	1%	3%	43%
Poland	5%	2%	0%	92%
France	2%	97%	0%	0%
Switzerland	90%	7%	0%	3%
Austria	2%	0%	98%	0%
Slovakia	11%	1%	88%	1%
Czech Republic	7%	8%	0%	85%
Hungary	12%	0%	88%	0%
Romania	1%	0%	99%	0%
Bulgaria	3%	0%	96%	1%

Source: Problem Definition Annex 7, Panteia (2013)

For the Rhine and the Danube corridor, there is no other option than to navigate on the Rhine River or the Danube river, as there are no alternative fairways. This is different on the North-South and East-West corridor. These corridors comprise both two rivers: the Rhône and the Seine for the North-South corridor and the Elbe and Odra for the East-West corridors. These rivers are interconnected by canals and thus, operating on these corridors is possible without actually navigation on KSS-obliged river stretches. In order to compensate for this, factors have been used, based upon expert estimations by Panteia. The following factors have been used:

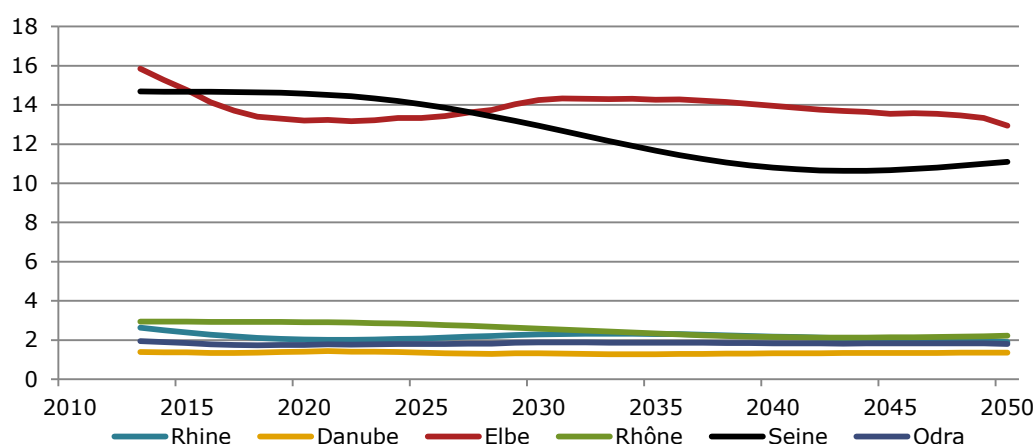
- Elbe river: 50% of the boatmasters allocated to the East-West corridor;
- Rhône: 0.3% of the boatmasters allocated to the North-South corridor;
- Seine: 5% of the boatmasters allocated to the North-South corridor
- Odra: 10% of the boatmasters allocated to the East-West corridor;

¹³⁵ This is excluding the exam itself.

¹³⁶ Boatmasters with local licenses are included in this allocation rate as well. This because according to section 5.2.6, there are only 204 boatmasters in Europe with a license with local validity, on a total of 12,250 Rhine Patents and Directive 96/50/EC licenses. Besides, it can be questioned if these local licenses are included in the business statistics of IWT transport.



Figure 7.12 Amount of boatmasters per year that can't do KSS exams in their own country



Source: Panteia (2014)

7.5.2 Travel expenses

Table 7.7 includes the average distance to the local boatmaster exam institute per country present in the labour market model.

Table 7.7 Average distance to the local boatmaster exam institute per country

Total	Local Exam Institute	Local Distance [km]	Time spent [h]
Austria	Linz	150	2
Belgium	Antwerp	50	1
Bulgaria	Ruse	100	1.5
Czech Republic	Dečín	50	1
France	Multiple	50	1
Germany	Multiple	100	1.5
Hungary	Multiple	100	1.5
Netherlands	Rijswijk	60	1
Poland	Szczecin	50	1
Romania	Ostrava	50	1
Slovakia	Bratislava	100	1.5
Switzerland	Basel	20	0.5

Source: Panteia Expert Estimation (2014)

However, at this moment the exams for KSS may only be taken in the local country or, in the case of the Danube and Rhine, any country member of either the Danube Commission or CCNR. This means large travel distances. For the relevant rivers, the following exam institutes have been chosen:

- Rhine: Magdeburg for Czech Republic / Poland, Wurzburg for other countries.
- Danube: Wurzburg for all non-Danube countries.
- Elbe: Magdeburg
- Rhône: Arles
- Seine: Rouen
- Odra: Frankfurt an der Oder



The distances from any of the countries to the relevant international exam institute are presented in Table 7.8.

Table 7.8 Distances from any of the countries to the relevant international exam institute [km]

<i>Nationality</i>	<i>Origin</i>	<i>Rhine</i>	<i>Danube</i>	<i>Elbe</i>	<i>Rhône</i>	<i>Seine</i>	<i>Odra</i>
Austria	Linz	436	150	670	1256	1221	633
Belgium	Brussels	50	511	624	1009	342	832
Bulgaria	Ruse	1713	100	1762	2244	2498	1781
Czech Republic	Melnik	353	435	353	1401	1219	373
France	Douai	50	620	1050	50	50	953
Germany	Marktheidenfeld	100	100	100	1044	788	100
Hungary	Gyor	728	100	776	1495	1513	796
Netherlands	Utrecht	60	521	494	1172	505	702
Poland	Szczecin	310	657	310	1684	1241	50
Romania	Bucharesti	1660	100	1709	2322	2445	1729
Slovakia	Bratislava	684	100	701	1483	1469	721
Switzerland	Augst	20	387	753	669	713	940

Source: Panteia Expert Estimation (2014)

For car costs, € 0.29 per kilometre have been taken as a base cost¹³⁷. These costs have been multiplied by Eurostat CPIs for various countries on personal transport expenses, with the Netherlands as base. See Table 7.9 for the factors used.

Table 7.9 Costs per kilometre for the countries present in labour demand/supply model.

<i>Total</i>	<i>Factor</i>	<i>Car costs per kilometre</i>
Austria	92%	€ 0.27
Belgium	88%	€ 0.26
Bulgaria	70%	€ 0.20
Czech Republic	72%	€ 0.21
France	92%	€ 0.27
Germany	88%	€ 0.26
Hungary	76%	€ 0.22
Netherlands	100%	€ 0.29
Poland	71%	€ 0.21
Romania	76%	€ 0.22
Slovakia	74%	€ 0.21

Source: Eurostat (http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=prc_ppp)

7.5.3 Travel time

Travel times to the local exam institutes are presented in Table 7.7. For relevant international exam institutes, the travel times are presented in Table 7.10.

¹³⁷ Belastingdienst (2014), Handboek Loonheffingen 2014



Table 7.10 Travel times [h] to international exam institutes for KSS

<i>Nationality</i>	<i>Origin</i>	<i>Rhine</i>	<i>Danube</i>	<i>Elbe</i>	<i>Rhône</i>	<i>Seine</i>	<i>Odra</i>
Austria	Linz	8	4	12	23	11	13
Belgium	Brussels	2	10	11	19	7	15
Bulgaria	Ruse	35	3	37	45	50	38
Czech Republic	Melnik	7	9	7	25	22	7
France	Douai	2	11	20	2	2	17
Germany	Marktheidenfeld	3	3	3	19	14	3
Hungary	Gyor	13	3	15	28	27	15
Netherlands	Utrecht	2	10	9	22	9	13
Poland	Szczecin	6	12	6	29	22	2
Romania	Bucharesti	34	3	36	47	48	36
Slovakia	Bratislava	12	3	13	27	25	13
Switzerland	Augst	1	7	14	13	13	16

Source: Panteia Expert Estimation (2014)

Once a boatmaster is travelling to an international exam institute for a KSS exam, he is not able to work and thus (s)he misses income. This effect can be monetized. However, boatmasters' wages differ among the European countries. Table 7.11 presents the wage factors compared to the Netherlands (index = 100) and the wage per hour for the countries represented in the labour market model.

Table 7.11 Labour costs for the countries present in labour demand/supply model.

<i>Total</i>	<i>Factor</i>	<i>Wage per hour</i>
Austria	176%	€ 31.87
Belgium	145%	€ 26.32
Bulgaria	14%	€ 2.61
Czech Republic	32%	€ 5.74
France	134%	€ 24.31
Germany	97%	€ 17.57
Hungary	33%	€ 5.90
Netherlands	100%	€ 18.12
Poland	31%	€ 5.65
Romania	23%	€ 4.10
Slovakia	34%	€ 6.10

Source: Eurostat (2014)

7.5.4 Language courses

As boatmasters cannot do the KSS exam in their own country, they need to have general knowledge of the national language of the country in which the respective river is situated. It should be addressed that basic speaking knowledge is not sufficient, when it comes to written exams. Thus, it has been assumed that all boatmasters that do not master any of the official languages of a country / river basin, need to attend a language course in order to prepare themselves for the exam¹³⁸.

¹³⁸ Here it is assumed that learning the language takes place during leisure time. Therefore, no costs have been assumed for this.



For language courses, € 609 has been used for the German language and € 445 for the French language¹³⁹. These costs have been multiplied by Eurostat CPIs for various countries on educational expenses, with the Netherlands as index = 100. See Table 7.12 for the factors used and the costs per language course.

Table 7.12 Costs for language courses in EU countries.

<i>Total</i>	<i>Factor</i>	<i>German language course</i>	<i>French language course</i>
Austria	134%		€ 595.84
Belgium	122%	€ 742.85	
Bulgaria	16%	€ 96.78	€ 70.72
Czech Republic	41%	€ 248.64	€ 181.69
France	100%	€ 610.54	
Germany	89%		€ 395.72
Hungary	28%	€ 172.46	€ 126.01
Netherlands	100%	€ 609.00	€ 445.00
Poland	34%	€ 207.98	€ 151.97
Romania	16%	€ 96.78	€ 70.72
Slovakia	36%	€ 216.21	€ 157.99

Source: Eurostat (http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=prc_ppp)

7.5.5 Total costs

The following Table 7.13 shows the NPV of the benefits that boatmasters derive from having their exam in their country of origin, in their native language. From this table it can be concluded that the benefits are relatively modest.

Table 7.13 NPV of the benefits that boatmasters derive from having exams in their country of origin

<i>Total</i>	<i>2030</i>	<i>2050</i>
Travel expenses	€ 240,780	€ 294,276
Travel time	€ 127,656	€ 155,827
Language courses	€ 308,277	€ 361,973
Total	€ 676.713	€ 812.076

Source: Panteia (2014)

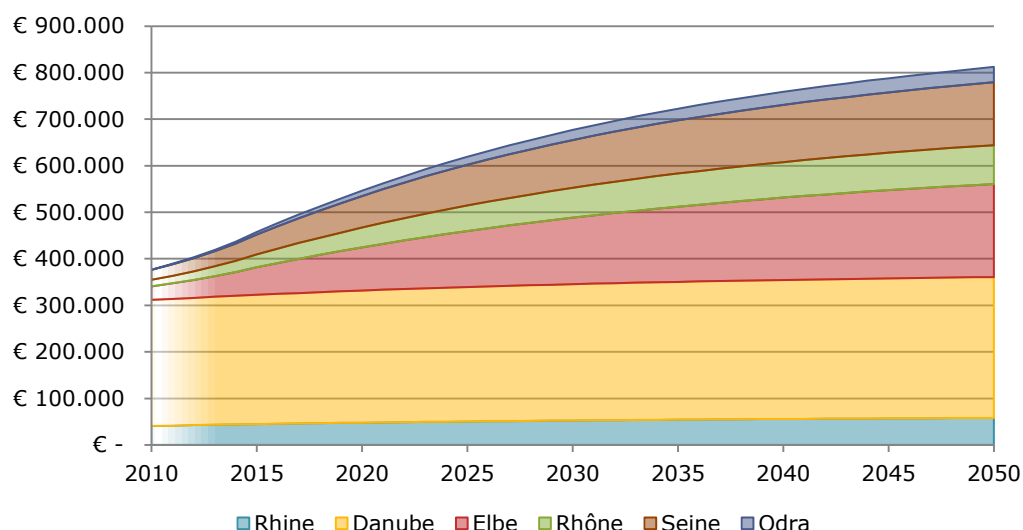
This can partly be explained by the fact that for CCNR countries, the exams for the KSS stretches on the river Rhine can already be done in the country of origin and in the native language of the respective CCNR Member State. In the case of the Danube, boatmasters from Danube countries are granted KSS recognition on most of the Danube upon passing their boatmasters exam. The following Figure 7.13 shows the net present value of the benefits that boatmasters derive from having exams in their country of origin per river where KSS are in force.

For non-EU countries, the NPV equals € 5,210 in 2030 and € 5,786 in 2050.

¹³⁹ Based upon information on language courses from the LOI: <http://www.loi.nl/talen/index.htm>



Figure 7.13 Net present value of the benefits that boatmasters derive from having exams in their country of origin per river where KSS are in force. This figure is linked with Table 7.15.



Source: Panteia (2014)

7.6 Mobility within the inland navigation labour market, functioning of the internal market and fair competition

Methodology

In order to determine the effects of the measure, the following approach is used:

1. Based upon current car costs for boatmasters to exam institutes, travel expenses are estimated, using CPI factors on travelling costs for the various countries;
2. Based upon current wage, travel expenses in terms of time spent are estimated, using CPI factors on wage for the respective countries;
3. Based upon the national language, it is estimated if a language course is needed for a boatmaster;
4. By summing up the car costs, the travel expenses in terms of time and the language courses, the total investment of a boatmaster is calculated¹⁴⁰;
5. By determining traveling distances and time to the local institute, estimations are made on the savings.
6. This is done for all countries in the labour demand/supply model and for all fairways with KSS;
7. By dividing the numbers by wage per month of a boatmaster, the impact of the KSS-costs is determined in the current situation and after applying the measure as a percentage of the brute wage of an IWT boatmasters.
8. The lower the costs in terms of a brute wage per month, the better the (financial) access to KSS-exams for an IWT workers and the higher the chance of a worker actually applying for such an exam. This way, insights will be given on potential mobility effects of the measure.

Results

The currents costs for a KSS exam per river basin per country are presented in Table 7.14 as a percentage of the wage per month per boatmaster.

¹⁴⁰ This excluding the exam itself.



Table 7.14 Costs of a KSS exam as a percentage of a month salary before applying the measure.

Country	Salary	Rhine	Danube	Elbe	Rhône	Seine	Odra
Netherlands	€ 3,445.93	0%	31%	30%	44%	26%	36%
Belgium	€ 5,006.19	0%	28%	31%	26%	9%	36%
Germany	€ 3,343.04	0%	0%	0%	39%	32%	0%
Poland	€ 1,073.93	28%	36%	28%	57%	46%	0%
France	€ 4,624.82	0%	29%	41%	0%	0%	38%
Switzerland	€ 5,516.05	0%	10%	20%	35%	36%	24%
Austria	€ 6,062.50	11%	0%	31%	42%	35%	31%
Slovakia	€ 1,159.92	36%	0%	37%	52%	51%	37%
Czech Republic	€ 1,091.25	32%	35%	32%	53%	48%	33%
Hungary	€ 1,122.04	34%	0%	36%	50%	50%	36%
Romania	€ 779.46	57%	0%	59%	72%	74%	59%
Bulgaria	€ 495.95	66%	0%	68%	74%	81%	68%

Source: Panteia Expert Estimation (2014), based upon CPI factors and the CAO wage table of the Netherlands

Table 7.6 shows that the costs for obtaining a KSS certificate are relatively high for workers from Romania and Bulgaria. It will cost them 57-66% of a month salary. Workers from Slovakia, the Czech Republic, Hungary and Poland are subjected to a 30% cut on their salary if they want to attend a KSS exam.

The costs for a KSS exam in terms of a net month salary will diminish if boatmasters can take their exam in their own country. Table 7.15 shows the costs of a KSS exam as a percentage of a month salary.

Table 7.15 Costs of a KSS exam as a percentage of a month salary after applying the measure.

Country	Salary	Rhine	Danube	Elbe	Rhône	Seine	Odra
Netherlands	€ 3,445.93	0%	2%	2%	2%	2%	2%
Belgium	€ 5,006.19	0%	2%	2%	2%	2%	2%
Germany	€ 3,343.04	0%	0%	0%	3%	3%	0%
Poland	€ 1,073.93	2%	2%	2%	2%	2%	0%
France	€ 4,624.82	0%	2%	2%	0%	0%	2%
Switzerland	€ 5,516.05	0%	1%	1%	1%	1%	1%
Austria	€ 6,062.50	5%	0%	5%	5%	5%	5%
Slovakia	€ 1,159.92	3%	0%	3%	3%	3%	3%
Czech Republic	€ 1,091.25	2%	2%	2%	2%	2%	2%
Hungary	€ 1,122.04	3%	0%	3%	3%	3%	3%
Romania	€ 779.46	3%	0%	3%	3%	3%	3%
Bulgaria	€ 495.95	3%	0%	3%	3%	3%	3%

Source: Panteia Expert Estimation (2014), based upon CPI factors and the CAO wage table of the Netherlands

Table 7.15 shows that workers from all countries will derive benefits from this measure. Measures have effects on workers from all countries, but significantly on those from Middle- and Eastern Europe. Whereas in the current situations workers from the Lower Danube countries (Romania, Bulgaria) will have to pay at least half a month salary for a KSS exam, after applying the measure it will only be 3% of a month salary. This will benefit labour mobility, as the barrier to attend an exam is lowered.



7.7 Employment and job creation in inland navigation

There are no jobs created because of the measures, but the employability of boat masters increases: due to provision of KSS services, setting the requirements at a proportional level and better access to examinations, the restrictions for boatmasters that start working on stretches with KSS will be not higher than needed for safety. With better access to KSS stretches, boat masters can be deployed more efficiently. At this moment, KSS creates a small but distinctive labour market for pilots. Measures targeting KSS might have a negative influence on the amount of persons employed as a pilot within the IWT sector.

7.8 Improved job quality/ job attractiveness

Employability of workers in IWT increases as demands are set at a level not higher than needed for safety purposes. This has a positive influence on job quality.

In order to create a basis for an estimate how measures contribute to job quality and job attractiveness, Table 4.2 is used. It is assumed that the different areas that determine job quality are relatively independent and that the more of these areas a measure scores, the higher the effect a measure has on job quality. In addition to this, it is important how many workers in IWT are influenced by this increased job quality over a certain period (here a period of one year has been taken). The combination of effect on job quality and the number of affected workers together determine the (qualitative) impact of a measure on job quality. In the following Table 7.16, these score have been shown.

Table 7.16: Job quality effects of measures for PD3 on Knowledge of Specific Situations (KSS)

Measure	Job quality / attractiveness indicators										# Workers (yearly)	Total score
	Work autonomy	Physical working	Health implications	Risks	Pace of work and workload	Social working environment	Meaningfulness	On-the-job training	Participation	Opportunities for advancement	Formal training	Type of contract
Criteria and minimum standards for KSS and better access to KSS-examination	+						+		+		550 ¹ 40 ²	0/+

¹ Current boatmasters that will benefit from the measures

² New inflow from training institutes that will benefit from the measures

Source: Panteia (2014)

7.9 Impact on SMEs

In the current situation, for smaller companies it may be more difficult to arrange a work planning in such way that staff is deployed that complies with the KSS. Further, in case of smaller vessels the costs that are concerned with KSS have a bigger influence on the tonne km costs than in case of larger vessels. Making it easier to have the exam that is required for KSS would particularly have a positive influence for smaller companies and/or smaller vessels on the difficulties described above. See Section 7.4 for detailed information on this topic.



7.10 Impact on third countries

Changes in the regulation concerning KSS will have no impact on workers from non-EU countries such as Switzerland (for the Rhine), Serbia, Bosnia, Moldova and Ukraine (for the Sava and the Danube) as their situation is not affected by the lower threshold to have an exam, as described above. These boatmasters will still have to do their KSS exam in any of the EU countries.



8 Difficulties with the recognition by national authorities of Service Record Books (SRBs) or of the information contained in the SRB's

In this chapter, the impact of the measures concerning the difficulties with the recognition by national authorities of Service Record Books (SRBs) or of the information contained in SRBs will be elaborated. Currently, some operational workers are downgraded in function, because of the fact that the information stored in their Service Record Books is not mutually recognised by countries or river commissions. Measures that focus on the harmonization of Service Record Books comprise:

- Harmonisation of required information contained in Service Record Books and mutual recognition of Service Record books;
 - Harmonisation to a system in which function differences still exist between Rhine regulations and other regulations;
 - Harmonisation to a system in which functions of operational workers are mutually recognized (cfr measure 1.8/1.9)
- Harmonisation of required information required in logbooks & mutual recognition of the logbooks;
- Harmonisation and of information stored in logbooks and SRBs, plus service record books and to be electronic
 - Big bang: all current SRBs are replaced by an e-SRB, all Logbooks are replaced by an e-Logbook
 - Transition period of 10 years: SRB holders use the old system until retirement or leaving the sector but not longer than for 10 years since entry into force of the new system. Also in the case of the e-Logbook a similar transition period is allowed.

The entries into a SRB are made and confirmed by the boatmaster of the vessel. SRB's have to be inspected yearly by a competent authority, that will usually compare the entries in the SRB with the entries into the logbook of the respective vessel. The competent authorities can only count navigation experience made in the last year prior to the inspection. In many countries in Europe, the crew member has to travel to the competent authority and has to provide proof of experience by means of copies of the logbook of the vessel of service. In the Netherlands, there is also a possibility to send in the proof by mail or e-mail.

8.1 Background

8.1.1 Paper Service Record Book

Currently, the service record book SRB used on the European Waterways is an obligatory professional document to be carried by any IWT worker under the level of boatmaster. It contains information about and serves as a proof with regard to the following information:

- physical and mental ability
- professional qualification and
- sailing time (an overview of the journeys the person made on a defined vessel)

In France, Service Record Books are not obliged for operational staff. Service Record Books are used though, to provide proof of the professional experience of boatmaster candidates.



The main issues of the existing system of paper-based SRB can be defined as followed:

1. Incomparability:

Lack of a common and standardized format for a Service Record Book in European inland navigation as a result of different formats and rules concerning the range of SRBs, can be considered as a barrier to labour mobility since not every SRB is valid on the entire European waterway system.

2. Fraud vulnerability:

Existing paper-based SRBs are usually not equipped with any safety features and therefore rather vulnerable to fraud and abuse. This might be amplified by the circumstance that there is also no centralized register for IWT certificates.

Harmonised CCNR Service Record Book

One should note that the information contained in Service Record books is already harmonised on some extent by means of the multilateral administrative arrangement by the CCNR and seven European states (Austria, Bulgaria, Hungary, Poland, Romania, Slovakia and the Czech Republic) that has been signed in December 2010. The only differences that occur between the SRB's of these countries are due to language, but the contents and formats of SRBs from different countries does not differ.

Contents of the mutually recognised SRBs are:

- A section reserved to the boatman's physical and mental fitness, which must be completed by the issuing authority.
- A section reserved for a listing of the journeys undertaken. This has to be presented to a competent authority for initialling every year. Any competent authority may stamp the document to authenticate the information on journeys carried out.
- A section reserved for the boatman's qualifications. All Service Record Books covered by the mutual recognition contain a page reserved for the listing of qualifications obtained in compliance with the Rhine regulations. This may only be filled in by a competent Rhine authority. Besides, a section is provided for any function outside of the Rhine river.

Figure 8.1 Example of a current CCNR mutually recognised Service Record Book

Qualification du titulaire conformément à l'article 3.02 du Règlement relatif au personnel de la navigation sur le Rhin/Befähigung des Inhabers nach § 3.02 der Verordnung über das Schiffspersonal auf dem Rhein/Bekwaamheid van de houder als bedoeld in artikel 3.02 van het Reglement betreffende het scheepvaartpersoneel op de Rijn

Qualification/als: _____
à compter du (date) _____
ab dem (Datum): _____
vanaf (datum) _____
Cachet, date et signature de l'auto-
rité/Stempel, Datum und Unterschrift der
Behörde/Stempel, datum en onder-tekening
door de autoriteit:

Qualification/als: _____
à compter du (date) : _____
ab dem (Datum): _____
vanaf (datum) _____
Cachet, date et signature de l'auto-
rité/Stempel, Datum und Unterschrift der
Behörde/Stempel, datum en onder-
tekening door de autoriteit:

Source: CCNR, 2010, *Règlement relatif au personnel de la navigation sur le Rhin (RPN)*, p 57



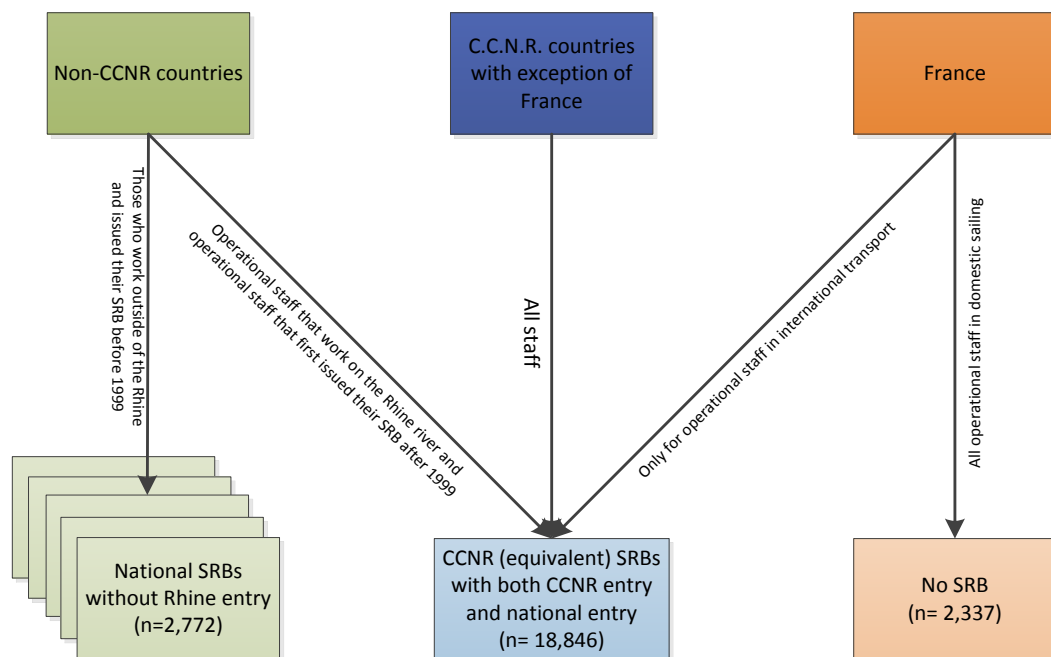
Non-Rhine Service Record Books

However, still national SRBs without Rhine entries are present for workers from non-CCNR countries. They are entirely different from each other and not comparable to those recognized by the CCNR¹⁴¹. For example, they miss out the page reserved for the Rhine function. Aquapol, the international police cooperation on the water (active within EU countries and Switzerland), characterises the variety of documents (estimation: over 500 different manning documents) as a very serious hindrance for effective control. While SRB's granted by CCNR states or CCNR recognised service record books are structured by the same or comparable patterns, the not recognised service books from Non-CCNR States may differ in design and content.

The incomparability of the existing certificates, as a result of different formats and rules concerning the range of SRBs, can be considered as a barrier to labour mobility since not every SRB is valid on the entire European waterway system. Furthermore it can be claimed, that the existing paper-based SRBs usually not equipped with any safety features are vulnerable to fraud and abuse in connection to the absence of a centralised register of IWT certificates.

Currently, there are three possibilities for an IWT worker with regards to a SRB. This is graphically presented in Figure 8.2.

Figure 8.2 Situation with SRB for operational staff on European interconnected waterways.



Source: Panteia (2014)

The number of workers that map into the three possible options with regards to SRBs can be calculated by using the following methodology:

1. The maximum number of workers that are obliged to possess a SRB can be estimated from Annex 5, which contains the estimated amount of workers active in IWT.

¹⁴¹ The bearer of those service record books may be still capable and qualified to work on Rhine and Danube, but the clarification of the quality of training and the standards of the particular national certifications may rise misunderstandings and ambiguities concerning the actual individual qualification



2. The number of operational workers that possess a Rhine SRB is equal to (a) the workforce in Belgium, Germany, Luxembourg, the Netherlands and Switzerland **plus** (b) the number of non-CCNR workers that possess a Rhine SRB **plus** (c) the percentage of French operational workers in international transport.

- a. The number of operational workers from Belgium, Germany, Luxembourg, the Netherlands and Switzerland that possess a Rhine SRB is equal to **16,188 workers**.
- b. The number of non-CCNR operational workers that possess a Rhine SRB can be calculated by (i) adding the amount of non-CCNR workers that work in CCNR-countries **plus** (ii) the amount of workers that started in IWT since 1999¹⁴².
- i. The number of non-CCNR workers that possess a Rhine equivalent SRB can be calculated using Table 5.12. Here, the sum of SRBs is taken for:

o	Austria;	o	Bulgaria;
o	Croatia ¹⁴³ ;	o	Czech Republic;
o	Hungary;	o	Poland;
o	Slovakia;	o	Romania.

This figure shall be addressed as **($\Sigma W_{NR,R}$) = Minimum number of Non-CCNR workers that possess a Rhine SRB = 1,673 workers**.

As Table 5.12 only contains the number of Rhine-SRBs that have been registered by the Dutch authority, the amount is multiplied by 1.5 as Rhine-SRBs can also be issued in Germany or Belgium for all countries mentioned except of Poland and Slovakia¹⁴⁴. This way, the estimated amount of non-CCNR workers that possesses a Rhine SRB is **1,790 workers**.

- ii. For the remainder of workers, it should be noted that since 1999 the evolution towards an equivalent to the Rhine has started for the countries mentioned. This way, all operational born after 1979 – and now aged 35 or younger – will have an equivalent to the Rhine SRB.

Table 8.1 Percentage of operational workers younger than 35

Country	Percentage ≤ 35 years	Country	Percentage ≤ 35 years
Austria	11.7%	Bulgaria	8.7%
Croatia	9.6%	Czech Republic	8.8%
Hungary	11.7%	Poland	25.6%
Slovakia	8.7%	Romania	8.8%

Source: Panteia Expert Estimation (2014)

This way, a total of **295 workers** need to be added to the group of Rhine SRBs.

- iii. This way, a total of **2,085** operational workers from non-CCNR countries possess a Rhine equivalent SRB.
- c. On top of this number, the amount of French operational workers in international transport shall be added. For France, this equals 19.7% of the workers (see Annex 6) and thus the amount of French operational workers with a Rhine SRB can be calculated as: **19.7% x 2,910 = 573 workers**
- d. The total number of Rhine SRB in Europe is thus equal to:
16,188 + 2,085 + 573 = 18,846.

¹⁴² Evolution towards a Rhine equivalent SRB has started in 1999

¹⁴³ Although formally Croatia has not yet signed the multilateral agreement for the recognition of SRBs, application has been submitted and harmonisation is ongoing.

¹⁴⁴ Annex 5 reports 616 workers for Poland and Table 5.12 reports 588 Polish SRB's issued in the Netherlands. Taking a factor of 1.5 would result in a negative number of non-Rhine SRBs, which is not possible. Thus, for Poland a factor of 0.5 is taken. For Slovakia, the same issue arises, with the consequence that a factor of 1.0 is taken.



3. The number of workers that possess a national SRB without the possibilities to enter Rhine functions can be estimated at the sum of all non-CCNR workers from Annex 5¹⁴⁵ minus the final number from step 2b.

This equals: **4,857 – 2,085 = 2,772 workers.**

4. The number of workers without a SRB can be calculated using the total workforce of France, **minus** the amount of French operational in international transport. This equals: **2,337 workers.**

Table 8.2 Current situation with regards to SRB on the interconnected waterways in Europe.

Type of SRB	Type of worker	Number of cases	Percentage of total
Rhine SRB	Rhine worker	16,188	67.6%
Rhine SRB	Non-Rhine worker	1,790	7.5%
Rhine (equivalent) SRB	Non-Rhine worker (age ≤ 35y)	295	1.2%
Rhine SRB	French operational worker in international transport	573	2.4%
Rhine (equivalent) SRB	Total	18,846	78.7%
Non-Rhine SRB	Non-Rhine worker	2,772	11.6%
No SRB	French operational worker in domestic transport	2,337	9.8%
Total	Total	23,955	100.0%

Source: Panteia Expert Estimation (2014)

8.1.2 Electronic Service Record Book

An electronic version of the SRB (e-SRB) is a virtual version of the SRB, that can only be accessed digitally, via a computer or another suitable device that is connected with the internet, does not exist yet, but may be an option in the future. Like the paper SRB, an e-SRB would be obligatory for every crew member with exception of the boatmaster. At this moment, some crew-members on the Rhine are exempted from the obligation of yearly checks¹⁴⁶. The e-SRB should be in accordance with an EU format and rules.

An e-SRB should contain the same kind of professional information as the SRB currently used in the EU IWT does:

- physical and mental fitness
- professional qualification
- sailing time
- proof on the professional exp. on KSS stretches.

The e-SRB would also contain the following documentary proofs:

- copies of certificates and diplomas corresponding to the qualifications,
- a medical certificate attesting the mental and physical fitness of the holder.

Alike the regular SRBs, the following identification data should be included in e-SRBs:

- a unique identifier of the e-SRB,
- date of issue,
- issuing authority
- the holder's national ID-number,
- the holder's first and last names,
- the holder's date and place of birth,
- the nationality and identity document presented,

¹⁴⁵ Here, only the workers from countries that belong to the interconnected IWT network are taken, i.e: Austria, Slovakia, Hungary, Croatia, Romania, Bulgaria, Poland and the Czech Republic.

¹⁴⁶ This includes helmsman who do not have ambition to become boatmaster. Besides, boatmasters are not (always) obliged to possess a SRB: their Rhine Patent provides proof of the professional qualifications



Every crew member may only have one e-SRB. All e-SRB's should be registered. The register(s) would contain the full information contained in the e-SRB. The access to the e-SRB and to the registers/central register should be access protected. If decentralised system with national registers, efficient system for the exchange of information should be set up. Access rights to the e-SRB would comprise:

- The relevant competent authorities of the MS (or all issuing authorities of the MS) are entitled to make entries with regard to:
 - physical and mental ability
 - professional qualification
- Boatmasters are entitled to make entries with regard to:
 - sailing time
- Issuing authorities are entitled to make entries with regard to:
 - the identification data
 - data on physical and mental ability
 - data on professional qualification

- holders of e-SRBs
- boatmasters (except for sailing time)
- inspection bodies

- for reasons related to safety of navigation,
- in order to make entries justified by changes of relevant data

As already indicated, the SRB has a close connection with the logbook of the vessel of service. Currently, paper versions of the logbook are in use. Figure 8.3 shows an example of a page of a logbook.

[illegible]

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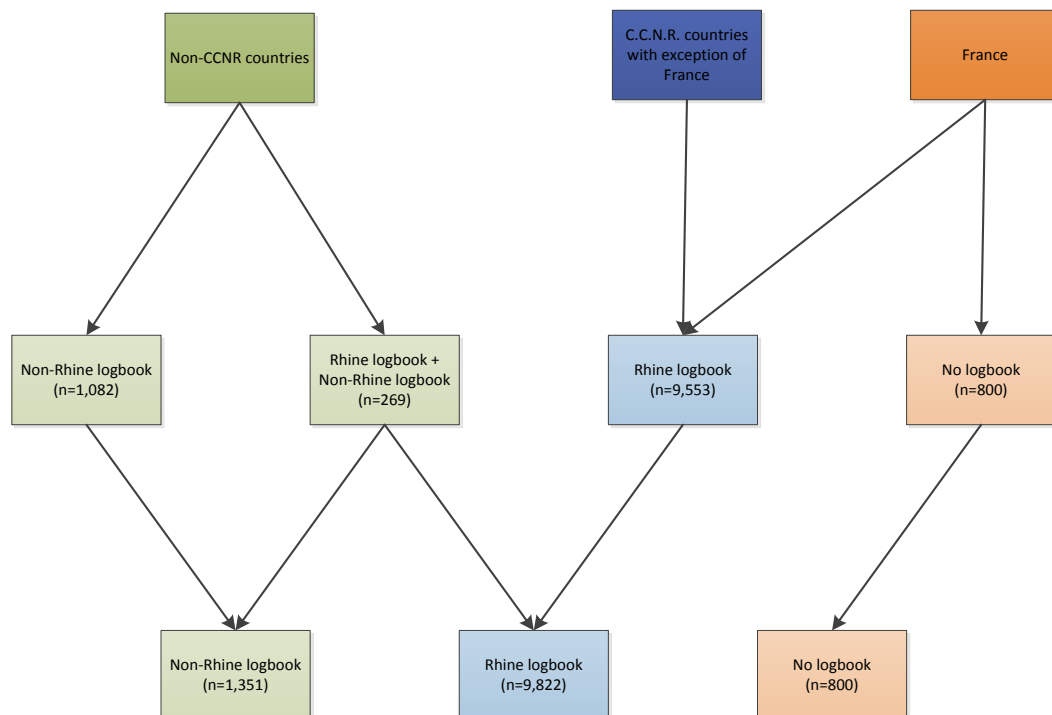
The logbook is a mandatory document for each commercial and self-propelled barge or other vessel (except for ferries) on the EU interconnected waterway network, with the sole exception of France. The logbook contains the navigation time of vessel and rest times of crew members. By means of the logbook, legislation on sailing and rest times can be enforced. Also, with the logbooks service records of crew can be checked, in case crew members wish to obtain a patent or license on the Rhine or any other KSS waterways, for which sailing experience needs to be demonstrated. A particular case where a vessel may have two logbooks is the case where a vessel from a Danube country (having a Danube logbook version) also sails on the Rhine. In that case also a logbook is needed that is recognized on the river Rhine or connected to a certain vessel when first issued.

In combination with the SRB, also the logbook may have an electronic version in the future.

Currently, there are four possibilities for vessel owners with regards to logbooks. This is graphically presented in Figure 8.4:

- A ship does only have a Rhine logbook;
- A ship does have both a Rhine and an outside-Rhine logbook
- A ship does only have an outside-Rhine logbook;
- A ship does not have a logbook.

Figure 8.4 Logbooks in Europe on the interconnected waterway network



Source: Panteia (2014)



The number of vessels that belong to these categories can be calculated by using the following methodology:

1. The number of workers that are obliged to possess a SRB can be deducted from Table 8.2, which contains the estimated amount of self-propelled vessels in Europe.

Table 8.2 Number of self-propelled vessels in Europe

Country	Dry cargo vessels	Liquid cargo vessels	Tugs and pushers	Total
Germany	916	419	425	1,760
Belgium	806	216	104	1,126
France	860	44	93	997
Luxembourg	8	16	11	35
Netherlands	3,993	1,240	1,128	6,361
Switzerland	17	55	2	74
Poland	109	2	0	111
Czech Republic	44	0	89	133
Austria	6	5	10	21
Slovakia	26	4	42	72
Hungary	78	2	79	159
Romania	75	4	252	331
Bulgaria	26	4	51	81
Moldova	8	5	11	24
Croatia	8	5	42	55
Serbia	62	5	122	189
Ukraine	84	3	88	175
Total	7,126	2,029	2,549	11,704

Source: Panteia Expert Estimation (2014)

2. The number of vessels that possess only a Rhine logbook is equal to (a) the number of vessels from Belgium, Germany, Luxembourg, the Netherlands and Switzerland **plus** (b) the percentage of French vessels in international transport
 - a. The number of vessels that possess a Rhine logbook in Belgium, Germany, Luxembourg, the Netherlands and Switzerland is equal to **9,356 vessels** (see Table 8.3).
 - b. The amount of French vessels operating in international transport can be estimated at 19.7%. These vessels need a logbook, which will be a Rhine logbook as France is a Member State of the CCNR. Thus, the amount of French vessels operating in the North-South corridor in international traffic can be calculated as: **19.7% x 997 = 197 vessels**
 - c. In total, the amount of Rhine logbooks can be estimated at **9,356 + 197 = 9,553**.
3. The number of non-CCNR vessels that possess a Rhine logbook can be calculated using Table 8.3, multiplied by the number of vessels that are operating on the ARA, Rhine and the East-West corridor deducted from Appendix 6. Here, the sum of vessels is taken for:

o Austria,	o Slovakia,	o Serbia
o Croatia,	o Bulgaria,	o Moldova
o Hungary,	o Romania.	o Ukraine

This way, it can be deducted that **269 vessels** obtain both a Rhine and a Non-Rhine logbook.



4. The number of vessels with only a non-Rhine logbook can be estimated, using Table 8.3, multiplied by the number of vessels that are not operating on the East-West, ARA or Rhine corridor deducted from Appendix 6. Here, the sum of vessels is taken for:

o Austria,	o Slovakia,	o Serbia
o Croatia,	o Bulgaria,	o Moldova
o Hungary,	o Romania.	o Ukraine

This way, it can be deducted that **1,082 vessels** obtain only a non-Rhine logbook

5. The number of vessels without a logbook can be calculated using the total amount vessels in France, **minus** the amount of French vessels operating in any other corridor but the North-South corridor **minus** the amount of French vessels operating on the North-South corridor in international traffic. This equals: **800 vessels**.

Table 8.3 Current situation with regards to logbooks in the MS of Europe

Type of logbook	Number of cases	Percentage of total
Only a Rhine logbook	9,608	81.6%
Only a non-Rhine logbook	1082	9.2%
Both Rhine/non-Rhine logbook	269	2.3%
No logbook	800	6.8%
Total	11,704	100.0%

Source: Panteia Expert Estimation (2014)

8.1.4 Transition between SRB/Logbook and e-SRB/e-Logbook

After entry into force of the provisions concerning e-SRBs, all IWT workers who start their professional life are obliged to hold an e-SRB. There will be no more SRBs issued in accordance with the old system. Also, the switch to an e-Logbook can be made.

For the holders of the current SRBs, the following options for transition are assessed.

- Big bang: all current SRBs are replaced by an e-SRB, all Logbooks are replaced by an e-Logbook
- Transition period of 10 years: SRB holders use the old system until retirement or leaving the sector but not longer than for 10 years since entry into force of the new system. Also in the case of the e-Logbook a similar transition period is allowed.

In case both e-SRB and e-Logbook are implemented, the data entered can be coupled, meaning that e-SRB and e-Logbook will always mention the same data. Verification of experience of a crew member can be done automatically. Also enforcement will be easier. Another benefit is in case of loss or theft of a regular SRB. Any loss or theft should be reported to the police, after which a new SRB will then be issued by the competent authority. However, in nearly all EU Member States, loss of the SRB means that also the information in the SRB is lost. This may cause serious problems for the IWT worker involved, as indicated in section 5.4.7. In the Netherlands, data from the paper SRB's is stored electronically when SRB's are checked and navigation time is validated. This way, information in the SRB may be (partly) restored in case of theft or loss. In case of an e-SRB, data cannot be lost or stolen.



8.2 Investment costs

Investment costs concern the costs for renewal of the SRB / Ship logbook. This depends on the rate of adoption of the harmonised SRB. Within Europe, the contents of SRBs does not differ among countries (despite the cover of the SRBs) . Difficulties concern the recognition of some information as explained under Problem driver 1.. Only Rhine countries can provide proof of Rhine functions acquired by professional experience and training. Furthermore, some countries (France) have different regulations regarding sailing time.

8.2.1 *Harmonisation of required information contained in Service Record Books and mutual recognition of Service Record Books*

It can be considered that there is no investment costs related to this measure if no replacement of existing paper SRBs is required and only new SRBs are issued in line with the harmonised EU model.

8.2.2 *Harmonisation of required information required in logbooks & mutual recognition of the logbooks;*

Currently, two logbook systems are applicable: those who are applicable on the Rhine and those who are applicable outside of the Rhine. The ship logbook issued by a non-CCNR member state even if based on Rhine prescriptions is not automatically recognised. For example, a vessel with an Austrian logbook needs a second logbook which has to be signed by a CCNR member state for the river Rhine.

It should be noticed that both the Rhine and the non-Rhine logbook contain exactly the same information. Harmonisation of the required information and mutual recognition of the logbooks would thus not provide any significant investment costs. It will only reduce the administrative costs of vessels from non-Rhine countries that wish to sail on the Rhine area. This will be assessed in section 8.4.2.

8.2.3 *Harmonisation and of information stored in logbooks and SRBs, plus service record books and to be electronic*

In case of an electronic SRB and logbook, costs are incurred with regards to setting up the system and maintaining it. These costs are expected to be high. For access to the e-SRB as well as the e-Logbook, a device with access to the internet is required. Especially in case of small vessels this may be an investment (see also Administrative burden and SME's).

8.3 Mobility within the inland navigation labour market, functioning of the internal market and fair competition

8.3.1 *Harmonisation of required information contained in Service Record Books and mutual recognition of Service Record Books*

If almost all SRB on interconnected waterways are mutually recognised impact of this measure on mobility should per se not be significant; it is just a supporting tool of measure taken under PD1 (see section 5.2.7). If there is no obligation to have a SRB, the situation for French operational workers will also not change.

8.3.2 *Harmonisation of required information required in logbooks & mutual recognition of the logbooks;*

The Harmonised logbooks and mutual recognition will not have an effect on the mobility within the inland navigation labour market, nor will it have on functioning of the internal market and fair competition.



8.3.3 Harmonisation and of information stored in logbooks and SRBs, plus service record books and to be electronic

Electronic versions of the Service Record Books and logbooks will have benefits alike the paper versions of the two documents, plus the additional effect of fraud with sailing times or working with underqualified staff being diminished. Dutch statistics indicate infringements with underqualified staff in 3.4% of their inspections, being undermanned in 4.5% in their inspections and infringements with regards to sailing times in 7.7% of the cases¹⁴⁷.

8.4 Safety

8.4.1 Harmonisation of required information contained in Service Record Books and mutual recognition of Service Record Books

The measures are aimed at a proper registration of a worker's service record. As such, the measures proposed have no effect on safety. However, if it can be prevented that unqualified workers by committing fraud present themselves as qualified ones, there will be a safety effect. However, the magnitude of this effect cannot be measured, due to a lack of statistics¹⁴⁸.

8.4.2 Harmonisation of required information required in logbooks & mutual recognition of the logbooks;

The harmonisation of logbooks itself will not have any effect on safety. Currently, both logbook systems are in line with each other.

8.4.3 Harmonisation and of information stored in logbooks and SRBs, plus service record books and to be electronic

By introducing electronic service record books and logbooks, fraud with using underqualified staff as well as fraud with sailing undermanned or sailing to long will be diminished.

8.5 Administrative costs

8.5.1 Harmonisation of required information contained in Service Record Books and mutual recognition of Service Record Books

There may be savings on administrative costs as non-Rhine workers can have their SRBs checked in their own countries in case they acquire enough navigation experience to promote to a higher Rhine function. Currently, only Rhine authorities can award functions on the Rhine.

In order to model this, the following approach has been used;

1. The amount of current operational workers from non-CCNR countries that are allocated to the Rhine corridor, is calculated using Table 7.6 and the labour/demand supply models. For the current operational workers, 20% will have lower functions on the Rhine as a result of their qualifications not being recognised¹⁴⁹.
 - a. For the helmsmen (44% of the total), 70% will drop one level and the remaining 30% will drop two function levels to boatman.

¹⁴⁷ See also: www.ilent.nl/.../binnenvaart_ondergekwificeerd_personeel_en_bemanningssterkte.aspx

¹⁴⁸ See also Panteia et al. (2014), Contribution to the problem definition in the context of the preparation of the Impact Assessment regarding the recognition of professional qualifications in inland navigation, Annex 4.

¹⁴⁹ See also section 5.2.7.



- b. For the able boatman (*15% of the total*), 80% will drop one level to boatman, and the remaining 20% will drop two levels to deckhand with an assumed professional experience of two years in inland navigation.
 - c. All the boatman (*41% of the total*) will drop one level to deckhand with an assumed professional experience of one year in inland navigation.
2. For future operational workers, a 100% start rate at deckhand is assumed with no navigation experience.
3. Workers are assumed to have their SRBs checked until they reach the function of helmsmen. This includes a maximum of three checks by Rhine authorities.
4. If SRBs are harmonised, these checks can also be done in the home country. This would save travelling expenses. Travelling expenses saved are calculated according to the distances in Table 7.8 and the costs per kilometre from Table 7.9, minus distances to local waterway authorities as presented in Table 7.7.
5. The costs for time spent on travelling, and waiting for the check at the competent authority are calculated by the travelling times to the German institute (Table 7.10) minus the time to the local competent authority (Table 7.7) plus 1.5 hour for the actual check of the SRB.
6. The travelling times are monetized using the wage factors in Table 5.15 and the wage factors in Table 7.11.
7. On top of this, costs for making copies of the ship logbook (€ 25,00) and the differences in the costs of validation of the SRB are taken into account (€ 19,80). See Table 8.5.

Table 8.5: Costs for validation of the SRB

Country	CPI factor	Costs of validation in home country	Costs difference with Germany
Austria	109%	€ 21,55	€ -2,14
Bulgaria	24%	€ 4,66	€ 14,75
Czech Republic	50%	€ 9,84	€ 9,57
Hungary	39%	€ 7,69	€ 11,73
Poland	42%	€ 8,23	€ 11,19
Romania	27%	€ 5,25	€ 14,16
Slovakia	42%	€ 8,39	€ 11,02

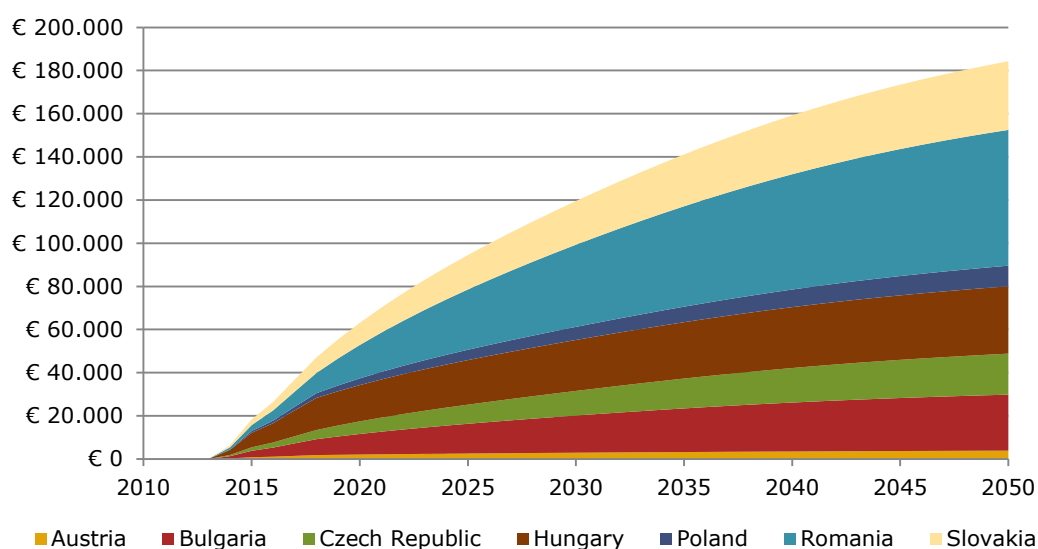
Source: Panteia (2014), based on Eurostat data on CPI factors for government services

Results

The results of this analysis are presented in Figure 8.6.



Figure 8.6 Savings on administrative costs when SRBs will be harmonised and mutually recognised.



Source: Panteia (2014)

The Net Present Value of the savings with regards to administrative costs counts up to € 119,560 for 2030 and € 184,321 in 2050.

8.5.2 Harmonisation of required information required in logbooks & mutual recognition of the logbooks;

If all existing logbooks in Europe will be mutually recognized, a maximum amount of 1,082 vessels will not have to purchase an additional Rhine logbook once they start sailing on the Rhine river. See Table 8.6 for a breakdown of costs.

Table 8.6: Costs for the renewal of ship logbooks (2014)

Country	Number of vessels	CPI	Costs of a logbook	Maximum administrative costs
Austria	21	109%	€ 85.96	€ 1,767.22
Bulgaria	78	24%	€ 18.59	€ 1,443.86
Croatia	55	44%	€ 34.83	€ 1,915.45
Czech Republic	11	50%	€ 39.26	€ 438.56
Hungary	136	39%	€ 30.67	€ 4,183.51
Poland	2	42%	€ 32.81	€ 80.13
Romania	328	27%	€ 20.94	€ 6,860.54
Slovakia	63	42%	€ 33.48	€ 2,109.51
EU-countries	694	34%	€ 27.09	€ 18,798.79
Serbia	189	25%	€ 19.39	€ 3,665.22
Ukraine	175	42%	€ 33.48	€ 5,859.75
Moldova	24	27%	€ 20.94	€ 502.47
Non-EU countries	388	33%	€ 25.84	€ 10,027.44

Source: Panteia (2014), based on Eurostat data on CPI factors for government services

From Table 8.6, it can be derived that the maximum administrative costs for this measure will count up to € 18,799 for EU-countries. Additionally, vessels from third countries will be faced with a maximum additional cost of € 10,027.

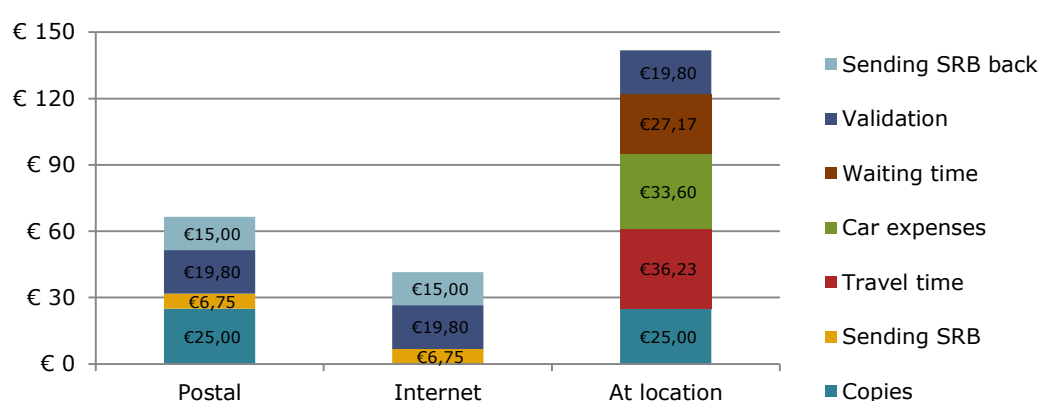


8.5.3 Harmonisation and of information stored in logbooks and SRBs, plus service record books and to be electronic

In the current situation, after first issuing the SRB, the content needs to be verified on a yearly basis in case crew members wish to obtain a patent or license on the Rhine and other waterways. IWT workers that wish to let their SRB be verified, have to make copies of the relevant pages of the ship logbook. The average amount of copies is about 100. They have to submit these copies, together with the SRB to the competent authority. The way in which this is done varies per Member State.

Generally, the IWT worker concerned has to go to the competent authority (SAB for the Netherlands) once in a year in person to let his SRB be verified against the ship logbook. In some cases, for example in the Netherlands, it is also possible to do this via internet or to send the SRB and copies of Logbook by e-mail. Based on information of the competent authority, 73% of the workers checks their SRB at the competent authority (€ 141.80). Another 22% sends the SRB by post (€ 66.55) and the remaining 5% used the internet in order to check their SRB (€ 41.55). See Figure 8.7 for the breakdown of costs.

Figure 8.7 Costs of SRB checks in the Netherlands.



Source: Panteia (2014), based upon information of SAB.

In order to model the verification process within the EU, it is assumed that all workers that wish to let their SRB be verified, will do that in their country of origin. This assumption has been checked for the Netherlands with data from SAB and over 90% of the verifications concern a Dutch SRB. The proportion of IWT workers that have their SRB verified are assumed to be identical to the group of workers up to 30 years old¹⁵⁰. The following cost items have been taken into account. They were estimated separately for each country for which workers are obliged to have a SRB. In some cases, Dutch data that was used¹⁵¹, adjusted with relevant Eurostat CPI data for the other countries. Costs components of the process include¹⁵²:

- Travel time and costs to and from the competent authority;
- Cost of 100 copies of the logbook(s) per verification;
- Waiting time at the competent authority;
- Cost of verification.

¹⁵⁰ This includes the process from apprentice to a graduated boatman and/or helmsman, one year extra from helmsmen to become a boatman and it furthermore provides room for boatmasters that need KSS.

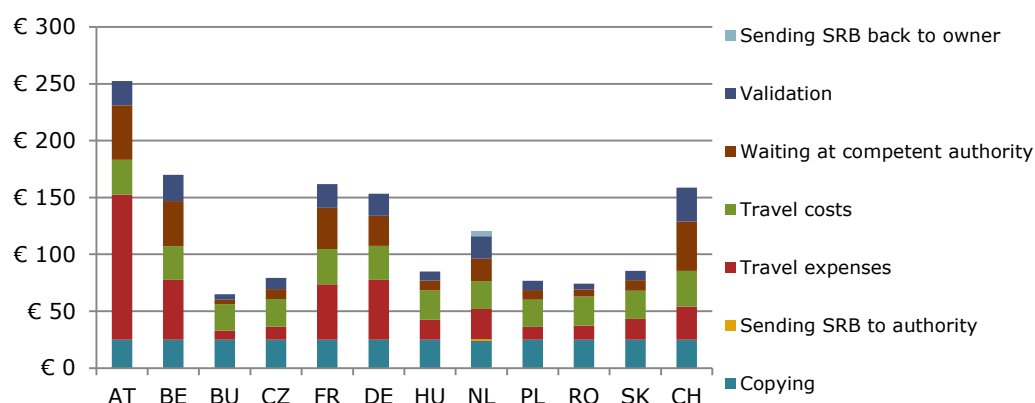
¹⁵¹ Data was provided by SAB on Wednesday 26th of March.

¹⁵² Data was retrieved with interview of SAB employees



In case of the Netherlands, the data was adjusted for the proportion of workers that submit the documents per mail or per e-mail. See Figure 8.8 for a breakdown of costs per country.

Figure 8.8 Administrative costs of yearly SRB checks per country

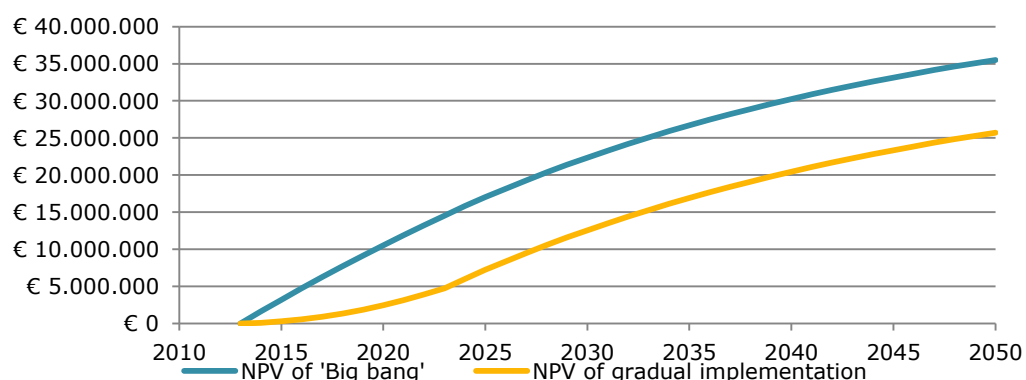


Source: Panteia (2014)

In case of an e-SRB and an e-Logbook, the verification of experience would be done automatically. In this case there are no costs incurred for the verification. Further, in case of an e-Logbook, no more paper versions need to be purchased. For the 'Big Bang' implementation, these benefits would be realised instantaneously. For a more gradual implementation, there would be a transition period in which workers would still have to turn to the competent authority for a verification of their documents, either because they still have a regular SRB or because of a regular logbook. In the analysis, it is also taken into account that a very limited amount (1%) of vessels does not possess a computer and an internet connection, and need to be purchased especially for the administration of the e-SRB/e-Logbook¹⁵³.

Figure 8.9 shows the Net Present Value of introduction of e-SRB and e-Logbook for a Big Bang scenario and a gradual approach.

Figure 8.9 NPV of introduction of e-SRB and e-Logbook for Big Bang scenario and gradual approach



Source: Panteia (2014)

¹⁵³ According to statistics from Promotie Binnenvaart Vlaanderen (2012) and Arbeidsgruppe Telematic (2011), 97% of the vessels possess a computer. 3-5% of the ships do not have an internet connection.



Table 8.7 shows the Net Present Value of benefits derived from savings made on verification of the SRB or the purchase of logbooks with 2030 or 2050 as a time horizon.

Table 8.7 Net Present Value of introduction of e-SRB and e-Logbook for Big Bang scenario and gradual approach for EU countries ¹⁵⁴

<i>Subpart</i>		<i>2030</i>	<i>2050</i>
Big bang	e-SRB	€ 13,764,909	€ 21,981,487
	e-Logbook	€ 8,594,917	€ 13,524,030
	Total	€ 22,359,825	€ 35,505,517
Gradual	e-SRB	€ 9,702,222	€ 17,918,800
	e-Logbook	€ 2,864,654	€ 7,793,768
	Total	€ 12,566,876	€ 25,712,567

Source: Panteia (2014)

It can be concluded that a gradual approach for the introduction of the e-logbook and e-SRB will not have as much positive effects as a big bang approach. Moreover, a mix-up of paper and electronic devices might work contra productive during such a transition period.

8.6 Employment and job creation in inland navigation

There are no jobs created because of this measure, but existing gaps can be better filled as the employability of workers in IWT increases.

8.7 Improved job quality/job attractiveness

With the e-SRB and the e-Logbook, fraud with SRBs is combated in a more efficient way. This diminishes unfair competition and adds to a level playing field. Meaningfulness and social work environment are key words here that prove a positive impact for job satisfaction. However, it must be noted that gradual introduction could lead to problems, when paper and e-versions of SRB as well as the Logbook are in use. In order to create a basis for an estimate how measures contribute to job quality and job attractiveness, Table 4.2 is used. It is assumed that the different areas that determine job quality are relatively independent and that the more of these areas a measure scores, the higher the effect a measure has on job quality. In addition to this, it is important how many workers in IWT are influenced by this increased job quality over a certain period (here a period of one year has been taken). The combination of effect on job quality and the number of affected workers together determine the (qualitative) impact of a measure on job quality.

¹⁵⁴ In case of an e-Logbook, paper version no longer need to be purchased from the competent authority. In the Netherlands, a logbook costs € 78,98
source: SAB, <http://www.sabni.nl/sabvaardocs/index.php/vaartijdenboek/informatie-vaartijdenboek>



Table 8.7: Effects on job quality for PD4 measures on e-SRBs.

Measure	Job quality / attractiveness indicators											# Workers	Total score	
	Work autonomy	Physical working	Health implications	Risks	Pace of work and workload	Social working environment	Meaningfulness	On-the-job training	Participation	Opportunities for advancement	Formal training			Type of contract
Harmonised paper SRB + mutual recognition	0						0						0	
Harmonised logbook + mutual recognition	0						0						694	
e-SRB and e-Logbook (Big Bang)	+						+						43,000	++
e-SRB and e-Logbook (Gradually in 10 y))	-						+						5,000	0

Source: Panteia (2014)

8.8 Impact on SMEs

In the current situation, larger companies fulfil their administrative duties by submitting more SRBs at a time for verification. This allows for efficiency benefits. In the case of small companies, this is not possible. However, an e-SRB (and an e-Logbook) requires a computer (or another suitable device, such as a tablet or even a smartphone) with an internet connection. The internet penetration for large vessels is quite high (99%), but additional costs for small companies/ vessels may be incurred. This fact has been included in the calculations for the administrative costs.

8.9 Impact on third countries

The measure with regards to the harmonisation of ship logbooks will affect a maximum of 388 vessels operating under third countries flags on the Danube. Besides, the measures with regards to service record books will have an effect of workers from Serbia, Moldova, Switzerland, Bosnia and Herzegovina and Ukraine. The total costs for third countries are presented in Table 8.9.

Table 8.9 NPV of administrative costs related to the introduction of e-SRB and e-Logbook for Big Bang scenario and gradual approach for non-EU countries

Subpart		2030	2050
Big bang	e-SRB	€ 335,295	€ 591,895
	e-Logbook	€ 155,734	€ 245,046
	Total	€ 491,029	€ 836,941
Gradual	e-SRB	€ 130,020	€ 221,588
	e-Logbook	€ 105,660	€ 194,972
	Total	€ 235,680	€ 416,560

Source: Panteia (2014)



9 The standards for IWT education set at national level have not kept up with technological development

In this chapter, the impact of measures will be determined regarding education in IWT in order to achieve a level that is geared to technological developments. Measures comprise:

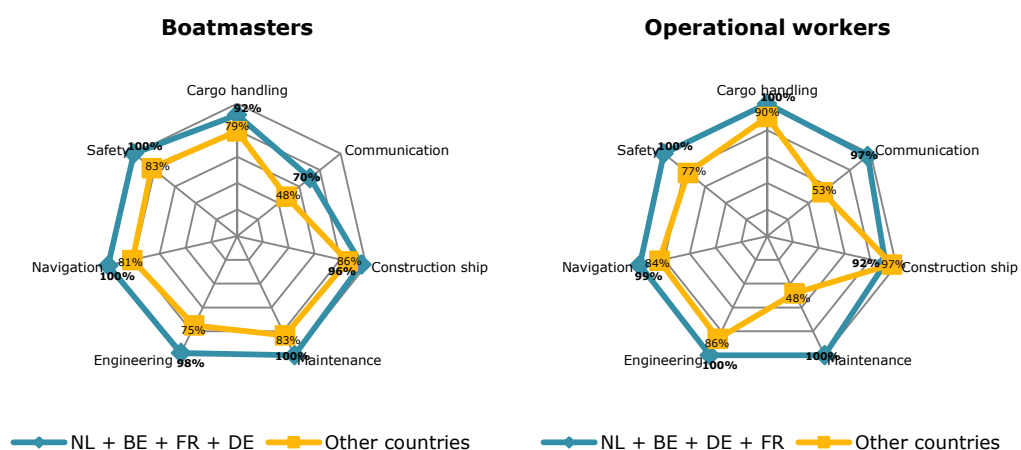
- Mutual recognition of diplomas and
- A voluntary certification system for IWT schools based on STCIN
- EU wide minimum standards for the exams (with a focus on safety).

9.1 Investment costs

In order to harmonize and improve IWT education on a national level, training curricula have been developed, based on STCIN. As this development has already taken place and investment costs have already largely been done, no additional investment costs are needed, even though STCIN only focusses on boatmaster level and operational level. However, with the exception of the machine room workers, IWT education focusses on two groups: there is education provided for boatman and boatmaster. Categories in between are left out of scope of the training institutes, and can be reached by the experience path¹⁵⁵.

Mutual recognition of diplomas does not incur additional costs. EU minimum standards for the exams do not require investments as well. However, in case IWT training institutes need to adapt their curriculum, an investment will be needed. See Figure 9.1 for the percentages of relevant competences mentioned in STCIN covered by boatmaster and operational worker curricula in two groups of Member States.

Figure 9.1 Percentage of relevant competences mentioned in STCIN covered by boatmasters and operational workers curricula in two groups of Member States



Source: Panteia (2014), based on data from PLATINA 1 D3.8.

¹⁵⁵ The education programs for helmsmen are meant for boatmasters. Once they finish education, they will still need one year of professional experience to obtain the boatmaster license, despite of the fact they already passed all the required exams. The difference with the specific boatmaster educational programs exist in entrepreneur skills: boatmaster educational programs are focussed on the group of boatmasters that wish to be self-employed.



It is assumed that the difference in accident frequencies between both groups for accidents that are specifically related to education and training can be attributed to differences in the level of training standards and the degree to which is kept up with technological developments. However, it must be noted that this is a conservative approach, as only the differences between the two groups are taken into account while from Figure 9.1 it can also be seen that both groups do not have a maximum score on all competence categories. This means that there may room for improvement for training institutes, in both groups of countries, although the first group has a score that is close to 100%.

9.1.1 Certification system

Setting up a certification system for IWT education and training institutes will incur investment costs. Based upon Dutch and Belgian figures for universities and high schools, a certification system to ensure the quality of educational programmes will cost € 7,500 per program per institute (price level 2005)¹⁵⁶. Since then, prices have increased by an EU average of 20.06%¹⁵⁷. This will bring the total costs for the certification of a new educational program at € 9,005 at the price level of 2014.

NAIADES SWP3.1 investigated all the IWT education and training institutes in Europe. In total, the 12 countries connected to the European IWT network offer 50 different education and training programs for the different functions in inland navigation. The voluntary approach assumes a 50% rate of the education volume of Non-CCNR schools implementing the minimum standards for exams. This way, only 50% of the non-CCNR education volume will get the same safety level as IWT-workers from CCNR-countries. This will lead to investment costs of € 423,211 (€ 450,225 if non-EU countries are included) in case of a mandatory implementation and € 310,657 (€ 324,164) in case of a voluntary implementation. For the total investment costs for this measure, see Table 9.1.

Table 9.1 Investment costs incurred for a certification system for IWT education and training institutes.

Country	Education programs						Investment	
	# of institutes	Boatman	Helmsman	Boatmaster	Engineer	Total	mandatory	voluntary
Austria	1	1	1	0	0	2	€ 18,009	€ 9,005
Belgium	2	2	2	2	0	6	€ 54,027	€ 54,027
Bulgaria	1	0	0	1	0	1	€ 9,005	€ 4,502
Czech Republic	1	0	0	0	1	1	€ 9,005	€ 4,502
France	4	2	2	2	0	6	€ 54,027	€ 54,027
Germany	3	2	2	1	0	5	€ 45,023	€ 45,023
Netherlands	3	3	3	3	0	9	€ 81,041	€ 81,041
Poland	1	1	1	0	0	2	€ 18,009	€ 9,005
Romania	4	3	4	3	2	12	€ 108,054	€ 54,027
Serbia	1	1	0	1	1	3	€ 27,014	€ 13,507
Slovakia	1	0	0	0	0	0	€ -	€ -
Hungary	1	0	1	1	1	3	€ 27,014	€ 13,507
Total	23	15	16	14	5	50	€ 450,225	€ 324,164

Source: Panteia (2014), based upon NAIADES SWP3.1, Inventory of IWT education and training institutes, Eurostat (prc_hicp_aind) and Inspectie van het Onderwijs (2005)

¹⁵⁶ Inspectie van het Onderwijs (2005), Accreditatie: de kosten in kaart

¹⁵⁷ Eurostat, http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=prc_hicp_aind



9.1.2 Additional costs indication for minimum standards

This would require an analysis of the curricula per member institute of EDINNA. As seen in Figure 9.1, investment costs will differ from school to school, depending on the competences covered. Adapting the curricula is one step in the process of harmonising IWT education. Furthermore, lesson materials, teaching aids and other means of should perhaps be adapted. Some materials are developed by projects within the EDINNA association, some however, might have to be tailor-made. Furthermore, e.g. train-the-trainer courses with respect to educating and training for competencies should be conducted. This would normally be around every 5 years. The costs of adaptation of curricula are strongly dependent on the extent of the adaptations needed. A rough estimate may vary from hundreds of thousand euro up to a million¹⁵⁸.

With regards to practical examination, various possibilities exist here. In the Netherlands, the use of theory, training vessels and the use of a ship-handling simulators are combined. The development of the practical exam (investment costs) in total (including theoretical exams and days on the training vessel and simulators) is about € 100,000 per country. The costs for the exams only are estimated at € 2,060 (see section 5.4.5).

It includes the development of the exams and programs and investment costs in dedicated training vessels. Currently, such practical exams have already been developed in Austria, Belgium, France, Hungary, the Netherlands, Poland, and Romania. Other countries (Bulgaria, Croatia, Czech Republic, Germany and Slovakia) would need to develop exams and programs, at an approximate cost of € 100,000 per country. See also Figure 5.2. This would lead to an investment costs of € 500,000 (€ 700,000 in case of non-EU countries being included).

9.2 Mobility within the inland navigation labour market, functioning of the internal market and fair competition

Harmonized training curricula and mutual recognition are strongly related to each other. It is the mutual recognition that provides the ground for harmonising entry barriers and greater mobility within the sector. However, mutual recognition needs to be backed up by IWT training curricula that are comparable. Else, workers from different countries would be treated differently and the level playing field would be seriously disturbed.

9.3 Safety

Based on an analysis of accident statistics, it can be shown that yearly 77.2 accidents are due to IWT education standards that have not kept up with technological development. The total yearly costs due to these accidents are presented in Table 9.2.

Table 9.2 Total yearly costs caused by accidents related to deficiencies in knowledge and skills.

<i>Costs linked to education and training standards</i>	
Work related accidents	€ 1,282,789
Navigation related accidents	€ 2,975,154
Total costs per barrier	€ 4,257,942

Source: Panteia (2014), Contribution to the Problem definition in the Context of the preparation of the Impact Assessment regarding the recognition of professional qualifications and training standards in inland navigation

¹⁵⁸ STC expert estimate



Measured in monetary terms, this means a damage of € 4,257,942.

If education standards of non-CCNR countries are harmonised with CCNR-countries, the number of operational errors, for both navigation and work-related accidents, will diminish. We have assumed the penetration rate of this education as follows:

If only one of the crew members on board is familiar with the current safety standards and technological developments, we assume that his knowledge will be a benefit to all crewmembers and thus, that he will influence the other members on board and stimulate them to work with the same standards. The fact of European boatmasters being obliged to make Risk Assessments¹⁵⁹ supports this assumption. In this model, we have estimated the amount of crew members on board to be 2.5 persons¹⁶⁰. The effectiveness of harmonised training standards can be described with this formula:

$E = 1 - (1 - (N_{\text{trained}} / N))^C$, whereas:

E	=	Effectiveness;
N_{trained}	=	Amount of workers trained with harmonized training standards;
N	=	Total amount of workers in IWT
C	=	Average amount of crew members per ship.

In the Problem Definition report, a difference in the accident risk frequencies was demonstrated between workers from CCNR and Non-CCNR countries. Two options have been analysed and compared to BAU:

- A mandatory adaptation of curricula for IWT schools, such that the quality of new boatmasters and operational workers will be levelled.
- The voluntary approach assumes a 50% rate of the education volume of Non-CCNR schools implementing the minimum standards for exam¹⁶¹. This way, 50% of the non-CCNR education volume will get the same safety level as IWT-workers from CCNR-countries.

The following steps were executed in order to evaluate the measure:

1. The analysis included an evolving age distribution based upon the labour demand/supply models for boatmasters and operational workers. These two groups have been split as boatmasters can start operating once they are 21 years old; first they will have to serve one year in the function of helmsmen as an operational worker.
2. Every year, the new inflow from education institutes will be educated according to the standards. This will be either 100% of the education volume for the mandatory implementation, or an assumed 50% of the non-CCNR volume in case of voluntary implementation. By dividing the amount of workers that did benefit from the measures by the total workforce, the effectiveness of the two measures can be evaluated.
3. For operational workers, only work-related accidents can be prevented. For boatmasters, both work-related accidents and navigation related accidents can be prevented. The percentage that can be prevented varies among the effectiveness of the measure. The work-related accidents that can be prevented are proportionally divided among the operational workers and the boatmasters. So, if there are 12,500 boatmasters and 25,000 operational

¹⁵⁹ In the Netherlands every boatmaster needs to make a Risk Assessment (due to ARBO laws), stating the risks while working and the measures to deal with these risks. This obligation is a result of implementing the Council Directive 89/391/EEC of 12 June 1989 on the introduction of measures to encourage improvements in the safety and health of workers at work.

¹⁶⁰ 25,276 workers in IWT freight and 10,000 self-propelled vessels, thus equalling 2.5 workers per vessel.

¹⁶¹ Panteia Expert Estimation

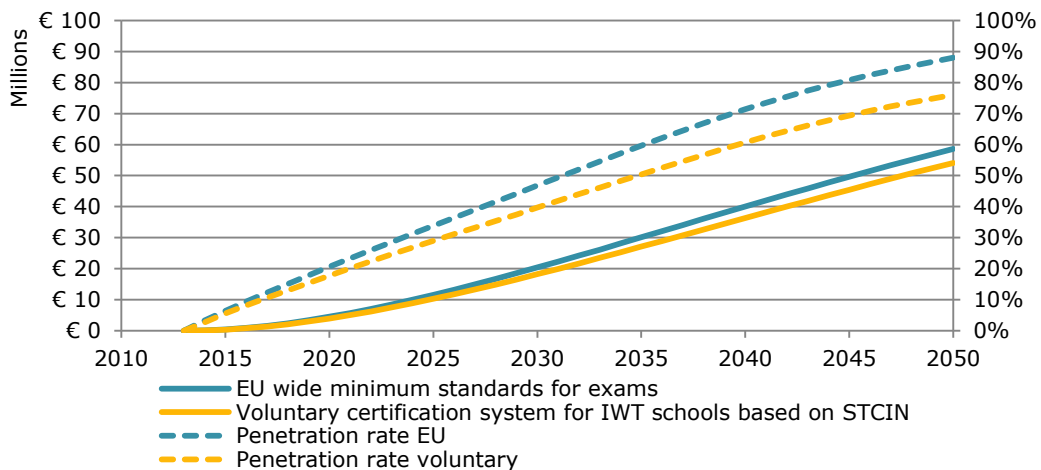


workers, two third of the effectiveness of the measure on work-related accidents will be related to operational workers and the remaining one third will be accounted to boatmasters.

4. The amount of tonne kilometres per worker increases steadily, based upon NEA et al. (2011). This is seen as a multiplication of the accident costs.

Figure 9.2 shows the results, if accident frequencies between CCNR and non-CCNR countries will be levelled by harmonizing and improving IWT education in these countries.

Figure 9.2: Net Present Value of measures regarding standards for IWT education



Source: Panteia (2014)

Figure 9.2 shows us a low penetration rate, but a fast-rising effectiveness of the measures. Thus, the Net Present Value is increasing fast, up to € 20,360,061 in 2030 and € 58,588,676 in 2050 for the EU wide minimum standards. For the voluntary approach, these figures are € 18,204,483 in 2030 and € 54,123,276 for 2050. These are benefits of the measures on safety.

9.4 Administrative costs

Setting up a certification system for IWT education and training institutes will not only incur investment costs, it will also lead to administrative costs as training institutes will need to be checked once every six years¹⁶². Such a check consists of two steps:

1. A validating and assessing authority shall submit a report, based upon self-evaluation of the institute, visitations to the institute by commissions and panels and other reports. Such a report will cost € 15,000 per institute (price level 2005)¹⁶³, exclusive value added tax.
2. The report by the validating and assessing authority shall be checked and evaluated by an accreditation committee. This will cost € 500 per institute per program (price level 2005)¹⁶⁴.
3. Internal quality management for the self-evaluation will lead to administrative costs too. The Dutch Education Inspection (IvhO) has estimated these costs to be € 55,000 per program (price level 2005) per education institute¹⁶⁵.

¹⁶² Inspectie van het Onderwijs (2005), Accreditatie: de kosten in kaart

¹⁶³ Ibid

¹⁶⁴ Ibid

¹⁶⁵ Ibid



4. As prices have increased by 20,06% in Europe during the last ten years, the total price has been multiplied to by this percentage to correct for inflation.
5. The results of these calculations will lead to the total administrative costs. However, as these checks have to be done once per six years, only one sixth of the total costs shall be presented in order to calculate the yearly administrative costs for a certification system.
6. For the voluntary option, 50% of the costs have been taken for IWT countries as it is assumed that only 50% of the education volume will get the same safety level as IWT-workers from CCNR-countries.

The yearly administrative costs for a certification system for IWT education and training institutes are presented in Table 9.3.

Table 9.3 Administrative costs incurred for a certification system for IWT education and training institutes.

Education programs								
<i>Country</i>	<i># of institutes</i>	<i># of</i>					<i>Administrative mandatory</i>	<i>Administrative voluntary</i>
		<i>Deckhand</i>	<i>Helmsmen</i>	<i>Boatmaster</i>	<i>Engineer</i>	<i>Total</i>		
Austria	1	1	1	0	0	2	€ 28,228	€ 14,114
Belgium	2	2	2	2	0	6	€ 84,683	€ 84,683
Bulgaria	1	0	0	1	0	1	€ 14,114	€ 7,057
Czech Republic	1	0	0	0	1	1	€ 14,114	€ 7,057
France	4	2	2	2	0	6	€ 84,683	€ 84,683
Germany	3	2	2	1	0	5	€ 70,569	€ 70,569
Netherlands	3	3	3	3	0	9	€ 127,025	€ 127,025
Poland	1	1	1	0	0	2	€ 28,228	€ 14,114
Romania	4	3	4	3	2	12	€ 169,366	€ 84,683
Serbia	1	1	0	1	1	3	€ 42,342	€ 21,171
Slovakia	1	0	0	0	0	0	€ -	€ 0
Hungary	1	0	1	1	1	3	€ 42,342	€ 21,171
Total	23	15	16	14	5	50	€ 705,692	€ 536,327

Source: Panteia (2014), based upon NAIADES SWP3.1, Inventory of IWT education and training institutes, Eurostat (prc_hicp_aind) and Inspectie van het Onderwijs (2005)

- The total costs involved with the measures equals € 663,350 (€ 705,692 if non-EU countries are included) per year for the mandatory introduction and € 515,156 (€ 536,327) per year for the voluntary option.
- The Net Present Value of Administrative costs adds up to € 8,392,900 (€ 8,928,624 if non-EU countries are included) in 2030 for the mandatory introduction and € 6,517,906 (€ 6,785,768) for the voluntary option.
- For 2050, the figures are € 13,206,159 (€ 14,049,115 if non-EU countries are included) for the mandatory introduction and € 10,255,871 (€ 10,677,349) for the voluntary option.



9.5 Employment and job creation in inland navigation

There is no extra employment created as a result of harmonised training. However, by a harmonisation and improvement of the training curriculum, employability of IWT workers would increase.

9.6 Improved job quality/job attractiveness

Job quality increases due to the fact that the job can be performed in safer way and IWT workers are better geared to their tasks.

In order to create a basis for an estimate how measures contribute to job quality and job attractiveness, Table 4.2 is used. It is assumed that the different areas that determine job quality are relatively independent and that the more of these areas a measure scores, the higher the effect a measure has on job quality. In addition to this, it is important how many workers in IWT are influenced by this increased job quality over a certain period (here a period of one year has been taken). The combination of effect on job quality and the number of affected workers together determine the (qualitative) impact of a measure on job quality. In the following Table 9.4, these score have been shown. Depending on these scores, a ranking of the measures has been determined.

Table 9.4: Effects on job quality for PD5 measures on education and training.

Measure	Job quality / attractiveness indicators											# Workers	Total score
	Work autonomy	Physical working	Health implications	Risks	Pace of work and workload	Social working environment	Meaningfulness	On-the-job training	Participation	Opportunities for advancement	Formal training		
Voluntary, via IWT schools			+	+							+	21,500	+
Mandatory, mutual recognition of diplomas			+	+							+	43,000	+
Mandatory, EU wide minimum standards			+	+							+	43,000	+

Source: Panteia (2014)

9.7 Impact on SMEs

Measures are not distinctive. Small as well as large vessels (companies) have the same costs and benefits. There is no particular effect on SMEs.

9.8 Third countries

There is no effect on third countries.



10 Language problems

The proposed policy measures that relate to language problems consist of either a voluntary or a mandatory implementation of Riverspeak¹⁶⁶. As regards the mandatory implementation, there are three variants: via IWT education, via the boatmaster certificate and via EU wide minimum requirements for crew below the level of boatmaster. In case of a voluntary implementation, the penetration rate is expected to be low; it is assumed that after 40 years, 50% of the IWT workers master river speak¹⁶⁷.

In case of a mandatory implementation, there are three implementation schemes:

- Via education
 - Via education only
 - Via education plus additional examination for those acquiring competences through the experience based path.
- Via the boatmaster certificate
- EU minimum requirements
 - For all crew;
 - For boatmasters only

In case of an implementation via the education institutes, the penetration rate will keep track with the worker turnover in the inland navigation sector. This means that after approximately 40 years, a whole generation of workers will be replaced by workers with a knowledge of river speak. As there are also workers that enter the sector horizontally from other sectors, the maximum uptake is estimated to be 80%.

In the case of implementation via the boatmaster exam, the same holds as described in the previous section, but then limited to the boatmasters only. Therefore, after 40 years, nearly all boatmasters master river speak. It should be addressed that the VHF on board of ships already brought some harmonisation for language. VN/ECE Resolution 35 (standardised vocabulary for radio connections) provides a useful reference as to phrases in ship to ship and ship-shore communications which should be understood. At the same time, Resolution 35 is not an exhaustive catalogue. For every boatmaster, knowledge of Resolution 35 is obliged: boatmasters are not allowed to sail a vessel if they do not have a radio license. However, the contents of Resolution 35 limit themselves to distress calls in case of urgent problems: sinking vessels, medical problems with crew members or other major problems. It does not contain phrases that deal with daily practice on board, such as manoeuvring in heavy vessel traffic, loading and unloading and communication with landside workers.

Lastly, in the case of EU minimum requirements, the penetration rate will be higher and more complete. It is assumed that the transition period will be 10 years before all workers in inland navigation will need to master river speak.

10.1 Investment costs

Investment costs depend on the way how this measure is implemented. Generally, river speak has largely already been developed. The costs for developing and

¹⁶⁶ Riverspeak contains a simplified form in which to communicate effectively in inland navigation. It consists of a broad terminology and nautical concepts. In addition to specific examples, it also includes examples of and advice on phrasing and pronunciation.

¹⁶⁷ Expert estimate.



translating import inland water transport phrases have already been made. We will consider these costs as sunk costs. However, depending on the measure, investment costs occur if the current population of inland navigation workers will be trained to master Riverspeak.

10.1.1 Mandatory implementation based on EU minimum requirements for all crew

In case of a mandatory implementation based on EU minimum requirements and a transition period of 10 years, all workers in inland navigation need to attend a course. This could be based on distance learning, so that costs could be kept low. The costs for this distance learning module will be comparatively low as compared to other language courses, as Riverspeak can be seen as a very small language course with basic communication. It is not as extensive as the costs for language courses as mentioned in Table 7.12. We estimate the costs of such a distance learning module to be equal to the costs of an inland navigation exam: € 82.60 at Dutch price level¹⁶⁸. Of course, after such a module, an exam is required to test the acquired knowledge. As not every candidate will manage to successfully finish the exam, a convergence rate of 70% is applied, equalling an average costs of € 118 per exam at Dutch price level¹⁶⁹. In Table 10.1, the average costs for the interconnected countries are presented.

Table 10.1 Average costs for a mandatory Riverspeak training course and exam.

Country	Factor	Price	Country	Factor	Price
Netherlands	100%	€ 200.60	Austria	109%	€ 218.32
Belgium	117%	€ 234.53	Slovakia	42%	€ 85.04
Germany	98%	€ 196.68	Czech Republic	50%	€ 99.69
Poland	42%	€ 83.35	Hungary	39%	€ 77.90
France	105%	€ 210.48	Romania	27%	€ 53.19
Switzerland	150%	€ 301.51	Bulgaria	24%	€ 47.19

* For other countries, Dutch price level will be applied.

Source: Panteia (2014), based upon Eurostat CPI factors on government services.

For a mandatory implementation based upon EU minimum requirements for all crew, a ten year transition period is assumed for the current population of workers. Based upon the labour demand/supply model, the number of affected people can be calculated. See Table 10.2 for an overview of the number of people that will be trained and the costs in case of a mandatory implementation based upon EU minimum requirements. The total costs for ship personnel can be estimated at € 4,279,060 (€ 4,572,566).

Table 10.2 Average costs for a mandatory Riverspeak training course and exam for ship personnel.

Country	Affected workers	NPV at 2023	Country	Affected workers	NPV at 2023
Netherlands	9,432	€ 1,596,015	Austria	398	€ 73,294
Belgium	1,764	€ 348,983	Slovakia	321	€ 23,028
Germany	4,003	€ 664,123	Czech Republic	586	€ 49,275
Poland	422	€ 29,671	Hungary	660	€ 43,367
France	2,809	€ 498,720	Romania	1,804	€ 80,935
Switzerland	1,154	€ 293,506	Bulgaria	749	€ 29,816
Other countries	4,975	€ 841,833	Total	29,077	€ 4,572,566

Source: Panteia (2014)

¹⁶⁸ <http://www.cbr.nl/download/Tarieven%20Binnenvaart%20per%201%20januari%202014.pdf>

¹⁶⁹ 70% will succeed after one exam, 21% after two exams, 6.3% after three exams.. etc. After numerous of such iterations, the average costs for a successfully finished exam equal € 118.00.



Not only ship personnel will have to master Riverspeak, also landside workers such as operators from locks and bridges will need to master Riverspeak. The amount of landbased workers in Europe can be estimated as around 5,519¹⁷⁰. Using the same methodology as for ship personnel, the costs can be estimated as around € 925,505 (€ 928,753 in case non-EU countries are included). See also Table 10.3.

Table 10.3 Average costs for a mandatory Riverspeak training course and exam for landbased personnel.

Country	Affected workers	NPV at 2023
Netherlands	1,472	€ 249,081
Belgium	418	€ 82,696
Germany	962	€ 159,602
Poland	172	€ 12,093
France	2,307	€ 409,593
Switzerland	4	€ 1,017
Austria	22	€ 4,051
Slovakia	4	€ 287
Czech Republic	74	€ 6,222
Hungary	18	€ 1,183
Romania	8	€ 359
Serbia	56	€ 2,229
Luxembourg	2	€ 338
Total	5,519	€ 928,753

Source: Panteia (2014)

The total costs for a mandatory implementation based upon EU minimum requirements can thus be estimated at € 5,204,565 (€ 5,501,319 in case non-EU countries are included).

10.1.2 Mandatory implementation based on EU minimum requirements for boatmasters only

For a mandatory implementation based upon EU minimum requirements for all crew, a ten year transition period is assumed for the current population of workers. Based upon the labour demand/supply model, the number of affected people can be calculated. See Table 10.4 for an overview of the number of people that will be trained and the costs in case of a mandatory implementation based upon EU minimum requirements.

Table 10.4 Average costs for a mandatory Riverspeak training course and exam for ship personnel.

Country	Affected workers	NPV at 2023	Country	Affected workers	NPV at 2023
Netherlands	4,777	€ 808,329	Austria	118	€ 21,790
Belgium	1,089	€ 215,359	Slovakia	61	€ 4,403
Germany	983	€ 163,164	Czech Republic	225	€ 18,890
Poland	194	€ 13,664	Hungary	133	€ 8,731
France	493	€ 87,507	Romania	365	€ 16,392
Switzerland	324	€ 82,394	Bulgaria	140	€ 5,568
Other countries	1,384	€ 234,195	Total	10,287	€ 1,680,386

Source: Panteia (2014)

¹⁷⁰ Based upon data provided by PC Navigo on the amount of locks and moveable bridges per country.



- The total costs for ship personnel can be estimated at € 1,597,991 (€ 1,680,386).
- Not only ship personnel will have to master Riverspeak, also landside workers such as operators from locks and bridges will need to master Riverspeak. Using the same methodology as for ship personnel, the costs can be estimated as around € 925,505 (€ 928,753 in case non-EU countries are included).
- The total costs for a mandatory implementation based upon EU minimum requirements can thus be estimated at € 2,523,496 (€ 2,609,139 in case non-EU countries are included).

10.1.3 Mandatory implementation based via the boatmaster certificate

For this option, no investment costs are incurred for ship personnel. The costs for landbased personnel can be estimated as around € 925,505 (€ 928,753 in case non-EU countries are included).

10.1.4 Mandatory implementation via education institutes.

For this option, no investment costs are incurred for ship personnel. The costs for landbased personnel can be estimated as around € 925,505 (€ 928,753 in case non-EU countries are included).

10.1.5 Mandatory implementation via education institutes + additional examination for those acquiring competences through the experience based path.

For this option, no investment costs are incurred for ship personnel. The costs for landbased personnel can be estimated as around € 925,505 (€ 928,753 in case non-EU countries are included).

10.1.6 Voluntary implementation

In case of a voluntary implementation, the study material could be made available at a very low cost, for example via the internet. Distribution costs could also be kept very low in that case. The same holds for an implementation that is related to educational programmes. We have assumed these costs to be close to zero. The costs for landbased personnel can be estimated as around € 925,505 (€ 928,753 in case non-EU countries are included).

10.2 Mobility within the inland navigation labour market, functioning of the internal market and fair competition

In case workers are better able to communicate, it is likely that they may be more footloose in their choice for a career in inland navigation. Mastering river speak may therefore contribute to an increased mobility on the inland navigation labour market. However, this effect should not be overrated. Given the rate of implementation, the measures may qualitatively relate to each other in the following way with regards to the mobility impact, see Table 10.5.

Table 10.5 Qualitative impact of the measures on mobility

Measure:	Score:
Voluntary	0/+
Mandatory, via education only	+
Mandatory, via education + additional examination for those acquiring professional experience through the experience based path	+
Mandatory, via boatmaster exam	+
Mandatory, via EU minimum requirements for all crew	++
Mandatory, via EU minimum requirements for boatmasters only	+

Source: Panteia (2014)



10.3 Safety

Resolving language problems contributes to safety. Based on an analysis of accident statistics, it can be shown that yearly 19.1 accidents are due to language problems. The major part of these accidents are navigation related accidents: collisions between ships and locks due to miscommunication. Each year, 17.8 accidents of this kind happen. For work-related accidents, this figure is 1.2 accidents per year¹⁷¹. The yearly damage to society caused by accidents related to language barriers is presented in Table 10.6.

Table 10.6 Total yearly costs caused by accidents related to language barriers.

Costs linked to language barriers	
Work related accidents	€ 455,578
Navigation related accidents	€ 719,892
Total costs per barrier	€ 1,175,470

Source: Panteia et al (2014), Contribution to the Problem definition in the Context of the preparation of the Impact Assessment, Regarding the recognition of professional qualifications and training standards in inland navigation

Measured in monetary terms, this means a yearly damage of € 1,175,470¹⁷².

In case of the implementation of river speak, safety benefits would be realised due to accidents avoided. These benefits depend on the penetration rate of the measures and the extent to which the measures get fully implemented.

A disproportionate relation is assumed between the effectiveness of the implementation of river speak and the number of accidents avoided. An extra worker that masters river speak contributes more to the effectiveness than one of the workers that already master river speak. This means that at the start of the implementation, the effectiveness increases very slowly, while at the end, towards full implementation, the effectiveness rises steeply.

In general, the following formula can be applied, when calculating:

E = (N_{trained} / N)² with:

E	=	Effectiveness of the measure
N _{trained}	=	Amount of workers capable of Riverspeak
N	=	Total amount of workers in IWT

Based on the above, benefits can be monetized by using the following methodology.

1. The analysis included an evolving age distribution based upon the labour demand/supply models for boatmasters and operational workers.
2. Every year, the new inflow from education institutes will be educated according the standards. By dividing the amount of workers that did benefit from the measures by the total workforce, the effectiveness of the two measures can be evaluated.
3. The amount of accidents that can be prevented is calculated using the following assumptions;
 - a. Operational workers can only prevent work-related accidents;

¹⁷¹ Panteia et al (2014), Contribution to the Problem definition in the Context of the preparation of the Impact Assessment, Regarding the recognition of professional qualifications and training standards in inland navigation

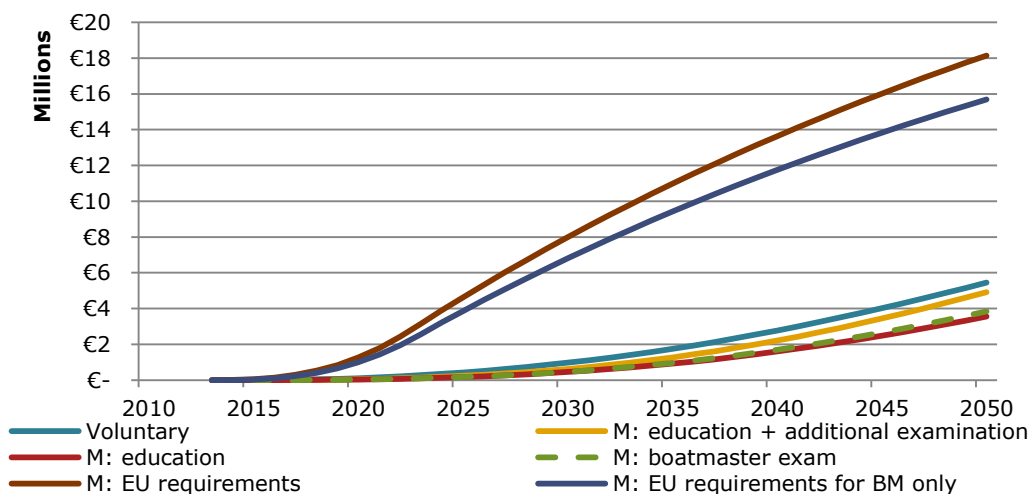
¹⁷² ibid



- b. Boatmasters can prevent navigation related accidents and work-related accidents;
 - c. Work-related accidents due to language problems that can be prevented are allocated proportionally over operational workers and boatmasters, based on their share in the total workforce.
4. The policy options act in the following way:
- a. For education measures:
 - i. A mandatory implementation through education has an effect of 85% of the total inflow (boatmasters plus operational workers);
 - ii. For additional examination for boatmen and boatmasters, the effect will be 100% of the total inflow.
 - b. A mandatory implementation via the boatmaster exam has an effect of 100% of the new inflow of boatmasters
 - c. The mandatory implementation via EU minimum requirements has got a 100% effect to the new inflow for all workers.
 - d. The voluntary implementation of the measure has got 25% effect to the current population of boatmasters and a 85% effect to the new inflow.
5. The percentage that can be prevented varies among the effectiveness of the measure. The work-related accidents that can be prevented are proportionally divided among the operational workers and the boatmasters. Example: if there are 12,500 boatmasters and 25,000 operational workers, two third of the effectiveness of the measure on work-related accidents will be related to operational workers and the remaining one third will be accounted to boatmasters.
6. The amount of tonne kilometres per worker increases steadily, based upon NEA et al. (2011). This is seen as a multiplication of the accident costs.

Figure 10.1 and Table 10.7 show the NPV for the various measures and for different time horizons.

Figure 10.1: Monetisation of safety effects



Source: Panteia (2014)



Table 10.7 Net Present Value of the measures

Measure	2030	2050
Voluntary	€ 978,219	€ 5,455,524
Mandatory, via education	€ 455,215	€ 3,555,784
Mandatory, via education plus additional examination for those acquiring professional qualifications through the experience based path	€ 630,056	€ 4,921,500
Mandatory, via boatmaster exam	€ 470,076	€ 3,841,034
Mandatory, via EU minimum requirements for all crew	€ 7,991,042	€ 18,145,267
Mandatory, via EU minimum requirements for boatmasters	€ 6,805,938	€ 15,692,512

Source: Panteia (2014)

10.4 Administrative costs

The total administrative costs for measures regarding are determined using the following methodology:

1. For every country, 15% of the inflow is considered to obtain their qualifications by the experience based path (For further background see Annex 4);
2. In order to estimate the lateral inflow, a factor has been used that is equal to the percentage of lateral entrants on the total workforce. This percentage equals 0.3% of the total workforce¹⁷³.
3. For land based personnel, a 5% rate of the total population has been used to estimate the new inflow per year.
4. The sum of the first three steps indicates the amount of applicants.
5. In order to determine the administrative costs, the total amount of applicants is multiplied by the costs for an exam, see Table 10.1.

10.4.1 Mandatory implementation based on EU minimum requirements for all crew

- For the non-graduates of IWT education that obtain their qualifications via the experience or the practical path, the administrative costs equal € 256,224 (€ 260,582 in case non-EU countries are included) in 2030 and € 396,357 (€ 403,608) in 2050.
- For lateral entrants, the administrative costs equal € 254,982 (€ 269,440 in case non-EU countries are included) in 2030 and € 390,926 (€ 410,442) in 2050.
- For land based personnel, the administrative costs will be € 694,091 (€ 696,526 in case non-EU countries are included) in 2030 and € 1,092,147 (€ 1,095,977) in 2050.
- The total administrative costs can thus be estimated as € 1,205,207 (€ 1,226,548 in case non-EU countries are included) in 2030 and € 1,879,429 (€ 1,910,026) in 2050.

10.4.2 Mandatory implementation based on EU minimum requirements for boatmasters only

- For the non-graduates of IWT education that obtain their qualifications via the experience or the practical path, the administrative costs equal € 92,308 (€ 93,712 in case non-EU countries are included) in 2030 and € 143,187 (€ 145,522) in 2050.
- For lateral entrants, the administrative costs equal € 97,644 (€ 98,764 in case non-EU countries are included) in 2030 and € 149,399 (€ 151,024) in 2050.
- For land based personnel, the administrative costs will be € 694,091 (€ 696,526 in case non-EU countries are included) in 2030 and € 1,092,147 (€ 1,095,977) in 2050.
- The total administrative costs can thus be estimated as € 884,044 (€ 889,002 in case non-EU countries are included) in 2030 and € 1,384,733 (€ 1,392,524) in 2050.

¹⁷³ Nederland Maritiem Land (2012) has reported 60 lateral entrants. It has been assumed that 17 of these workers to be school leavers, as the amount of students enrolled is taken as a proxy to the inflow from education institutes. Not all of these students will however finish their education. In total, the IWT workforce of the Netherlands equals 13,908 people. This way, the following equation can be made in order to estimate the factor for lateral entrants: $(60 - 17) / 13,908 = 0,3\%$ of the total workforce.



10.4.3 Mandatory implementation based via the boatmaster certificate

- For the non-graduates of IWT education that obtain their qualifications via the experience or the practical path, the administrative costs equal € 92,308 (€ 93,712 in case non-EU countries are included) in 2030 and € 143,187 (€ 145,522) in 2050.
- For lateral entrants, the administrative costs equal € 97,644 (€ 98,764 in case non-EU countries are included) in 2030 and € 149,399 (€ 151,024) in 2050.
- For land based personnel, the administrative costs will be € 694,091 (€ 696,526 in case non-EU countries are included) in 2030 and € 1,092,147 (€ 1,095,977) in 2050.
- The total administrative costs can thus be estimated as € 884,044 (€ 889,002 in case non-EU countries are included) in 2030 and € 1,384,733 (€ 1,392,524) in 2050.

10.4.4 Mandatory implementation via education institutes.

For this option, no administrative costs will be incurred for ship personnel as nothing changes for workers that enter the sector without having undergone IWT training. For land based personnel, the administrative costs will be € 694,091 (€ 696,526 in case non-EU countries are included) in 2030 and € 1,092,147 (€ 1,095,977) in 2050.

10.4.5 Mandatory implementation via education institutes plus additional examination for those acquiring professional qualifications through the experience based path.

- For the non-graduates of IWT education that obtain their qualifications via the experience or the practical path, the administrative costs equal € 256,224 (€ 260,582 in case non-EU countries are included) in 2030 and € 396,357 (€ 403,608) in 2050.
- For lateral entrants, the administrative costs equal € 254,982 (€ 269,440 in case non-EU countries are included) in 2030 and € 390,926 (€ 410,442) in 2050.
- For land based personnel, the administrative costs will be € 694,091 (€ 696,526 in case non-EU countries are included) in 2030 and € 1,092,147 (€ 1,095,977) in 2050.
- The total administrative costs can thus be estimated as € 1,205,207 (€ 1,226,548 in case non-EU countries are included) in 2030 and € 1,879,429 (€ 1,910,026) in 2050.

10.4.6 Voluntary implementation

For land based personnel, the administrative costs will be € 694,091 (€ 696,526 in case non-EU countries are included) in 2030 and € 1,092,147 (€ 1,095,977) in 2050.

10.5 Employment and job creation in inland navigation

There are no jobs created because of this measure, but existing gaps can be better filled as the employability of workers in IWT increases. As also mentioned above, in case workers are better able to communicate, it is likely that they may be more footloose in their choice for a career in inland navigation. Mastering river speak may therefore contribute to an increased mobility on the inland navigation labour market.

10.6 Improved job quality/job attractiveness

Job quality increases due to the fact that a better communication is possible. The effects of river speak implementation should not be overrated here, but topics such as less risks, social working environment, participation and the like are determinants of job quality.

In order to create a basis for an estimate how measures contribute to job quality and job attractiveness, Table 4.2 is used. It is assumed that the different areas that determine job quality are relatively independent and that the more of these areas a measure scores, the higher the effect a measure has on job quality. In addition to this, it is important how many workers in IWT are influenced by this increased job



quality over a certain period (here a period of one year has been taken). The combination of effect on job quality and the number of affected workers together determine the (qualitative) impact of a measure on job quality. In the following Table 10.8, these scores have been shown. Depending on these scores, a ranking of the measures has been determined.

Table 10.8: Effects on job quality for PD6 measures on language problems.

Measure	Job quality / attractiveness indicators										# Workers (yearly)	Total score
	Work autonomy	Physical working conditions	Health implications	Risks	Pace of work and workload	Social working environment	Meaningfulness	On-the-job training	Participation	Opportunities for advancement	Formal training	Type of contract
Voluntary				0/+	+			+		+	2,150	+
Mandatory, via education				+	+			++		+	765	++
Mandatory, via education + additional exam for those acquiring professional experience through the experience based path				+	+			++		+	900	++
Mandatory, via boatmaster exam				+	+			++		+	300	++
Mandatory, via EU minimum requirements for all crew				++	+			++		+	4300	++
Mandatory, via EU minimum requirements for boatmasters only				++	+			++		+	1500	++

Source: Panteia (2014)

10.7 Impact on SMEs

Measures are not distinctive. Small as well as large vessels (companies) have the same costs and benefits.

10.8 Third countries

There is no effect on third countries.



11 Synergy effects between measures aimed at different problem drivers

When combined, some of the measures that were aimed at different problem drivers reinforce each other, while others have a weakening effect. In this chapter 11 the possible synergy effects of the measures will be identified. Table 11.1 shows an overview of measures that either reinforce each other or weaken each other in terms of (financial) benefits when combined: i.e., measures that comprise stricter standards for boatmaster licenses will result into better safety, so do measures that comprise better training standards at IWT schools. However, if both measures are applied, one should not sum up the benefits: double counting of the same effect will be the result!

On the other hand, measures that target enlargement of inflow will reinforce measures that deal with better standards. Not only will there be the safety effects of the current workforce: also the new workers will benefit. In this case, the sum of the two effects will be higher than the two individual scores.

Table 11.1 Synergy effects between measures aimed at different problem drivers

Synergies	PD1	PD2	PD3	PD4	PD5	PD6
PD1: Problems with qualifications of workers in IWT sector		+	0	+	-	0
PD2: Problems with qualifications of workers outside IWT sector			0	0	0	0
PD3: KSS requirements & exams				+	0	0
PD4: Electronic SRBs					+	0
PD5: Education/training standards						0
PD6: Language problems						

Source: Panteia (2014)

The synergy effects as presented in Table 11.1 can be explained as follows.

Positive synergy between Problem Driver 1 and Problem Driver 2 measures

Concerning PD 1, lowering entry barriers for workers from outside the IWT sector will help the IWT labour market in terms of workforce. Benefits that aim at practical exams will not only provide benefits for workers inside the IWT sector, but will also make jobs in IWT more attractive for workers from outside the sector. The impact of measures concerning PD2 will then be reinforced. However, it is difficult to estimate the magnitude of this effect. Practical exams have been introduced in France (2004)¹⁷⁴ for boatmasters only, in Belgium for boatmen only (2007)¹⁷⁵ and in the Netherlands (2013) for both boatmasters and boatmen. Information from Belgium indicates a significant increase in the amount of exams for boatmen: from 83 candidates in 2007 to an average of 109 candidates in the next years¹⁷⁶. It must be noted that also a significant amount of Dutch operational workers have benefitted from this opportunity in Belgium.

Positive synergy between Problem Driver 1 and Problem Driver 4 measures

The benefits of PD1 measures may be jeopardized in the case of SRB fraud. Where workers make use of false SRB's, requirements with regards to qualifications may still be evaded. Misuse of SRB will then diminish the benefits of better qualified crews and

¹⁷⁴ http://www.vnf.fr/vnf/img/cms/Tourisme_et_domainehidden/permis_conduire_fluvial_201001291131.pdf

¹⁷⁵ <http://markt.vaart.nl/log/pivot/entry.php?id=1191>

¹⁷⁶ http://binnenvaart.be/nl/downloads/documents/BV_Cijfers_met_vaart_2_LR-december2013.pdf



will harm the level playing field. An e-SRB provides opportunities to more efficient and effective enforcement as fraud with e-SRB is at least very difficult. Misuse of SRB is then likely to decrease, thus further enhancing the benefits of PD1 measures. It is difficult to estimate the size of this additional positive effect, as currently there are no statistics about the extent to which SRB's are misused.

Positive synergy between Problem Driver 3 and Problem Driver 4 measures

Measures regarding the KSS exams and the electronic SRB will reinforce each other in such a way that proving professional experience on KSS-stretches will be easier once the SRB is electronic. Further, enforcement of KSS can be done in a more efficient and effective way. Therefore it is likely that any misuse will decrease. As there is no information available about the extent to which fraud with KSS currently occurs, it is not possible to estimate the additional positive effect.

Overlap between the impacts of measures related to Problem Driver 1 and Problem Driver 5

An overestimation of the safety effects will be made if measures on education and training standards are combined with measures that harmonise the requirements to obtain a boatmaster license and aligning the exams or measures that aim harmonisation of function profiles for other crew. These measures are closely related to each other: either targeting higher education standards or setting higher standards to workers.

Positive synergy between Problem Driver 4 and Problem Driver 5 measures

Alike the synergy effect between Problem Driver 4 and problem driver 1, also here the introduction of an e-SRB provides opportunities to more efficient and effective enforcement as fraud with e-SRB will become at least very difficult. Workers that make use of false SRB's may evade requirements with regards to qualifications. Once it is ensured that workers do have the right qualifications to fulfil the needs of their jobs, work in IWT becomes safer. If e-SRB are introduced, misuse of SRB is likely to decrease, thus further enhancing the benefits of PD5 measures and creating a better level playing field, as the amount of workers that make use of false SRB will diminish. It is difficult to estimate the size of this additional positive effect, as currently statistics on misuse are lacking.



PART 4: COMPARISON OF OPTIONS, CONCLUSIONS AND RECOMMENDATIONS



12 How do the options compare

This chapter contain overview tables in which the assessment of the measures is summarized. Mostly, values are monetized. For some measures, the evolution of the amount workers in IWT is investigate and presented. If this is the case, a **w** is added to result to indicate that the value concerns workers.



12.1 Problem driver 1 Difficulties with mutual recognition of professional qualifications of workers from within the IWT sector

Problem driver 1 Difficulties with mutual recognition of professional qualifications of workers from within the IWT sector (2030)									
		Investment costs (thousands of euro)	Mobility / internal market	Safety (thousands of euro)	Administrative costs(thousands of euro)	Employment /job creation (no.of jobs)	Job quality/ attractiveness (qualitative)	Impact on SMEs (qualitative)	Third countries (quantitative)
Boatmasters									
Certificates for vessels between 20 and 40 metres		0	666	0	-6	0	+	0	0
Certificates for large convoys		-1	-116	+	-0.4	0	-	-	-114
No derogation of member states to minimum age for issuing boatmaster licenses		0	-2,012	40	0	0	-	0	0
medical check-ups	medical check-up every year after 65	0	3w	-362	2,338	0	+	0	276
	every 5 years between 50-65, yearly after 65	0	-2w	281	-1,332	0	+	0	0
	at 60, 65, 70 and every two years hereafter.	0	9w	-1,990	7,715	0	+	0	621
Minimum experience	EU directive for EU: 4 years of experience, but experience or training may bring this down to 1	0	20,977	3,859	0	0	+	0	2,375
	CCNR approach for EU: 4 years of experience, but experience or training may bring this down to 2	0	-30,117	1,885	0	0	-	0	-117
	Competence based approach, 1 year experience required & competence proved.	-500	20,977	15,017	-3,223	0	+	0	2,123
Mutual recognition of BM certificates		0	658w	1,045	0	0	+	0	0
Harmonized requirements for a EU certificate		0	0	50,827	0	0	+	+	0



Problem driver 1 Difficulties with mutual recognition of professional qualifications of workers from within the IWT sector (2030)

	Investment costs (thousands of euro)	Mobility / internal market (no. of workers)	Safety (thousands of euro)	Administrative costs(thousands of euro)	Employment /job creation (no.of jobs)	Job quality/ attractiveness (qualitative)	Impact on SMEs (qualitative)	Third countries (quantitative)
<u>Operational workers</u>								
Mutual recognition of functions and qualifications without harmonization	0	10,412	0	9	0	++	+	1,024
Harmonization of function names and qualifications EU minimum requirements, MS may add functions	0	1,686	4,152	9	0	+	+	154
Mutual recognition of harmonized function descriptions and professional qualifications	0	10,412	4,152	9	0	++	0	1,024
Introduction + mutual recognition of certificates for engineers/ helmsmen at MS level	-69	8,732	0	-32	0	+	0	782



12.2 Problem driver 2 Difficulties with mutual recognition of relevant professional experience of workers from outside the sector (e.g. maritime sector)

<i>Problem driver 2 Difficulties with mutual recognition of relevant professional experience of workers from outside the sector (e.g. maritime sector) (2030)</i>									
		Investment costs (thousands of euro)	Mobility / internal market (no. of workers)	Safety (thousands of euro)	Administrative costs(thousands of euro)	Employment /job creation (no.of jobs)	Job quality/ attractiveness (qualitative)	Impact on SMEs (qualitative)	Third countries (qualitative)
Boatmasters	<i>alike EU proposal meaning to 1 year reduced (instead of 4)</i>	0	+474w	0	-78	0	225	+	0
	<i>alike CCNR meaning to 2 year reduced (instead of 4)</i>	0	-153w	0	16	0	-101	0	0
Operational workers	<i>Setting EU minimum requirements in accordance with EU proposal, taking into account 75% of the maritime experience gained</i>	0	+258w	0	-12	0	125	+	0



12.3 Problem driver 3 Knowledge of specific situations(KSSs) may prevent boatmasters access to certain river stretches

<i>Problem driver 3 Knowledge of specific situations(KSSs) may prevent boatmasters access to certain river stretches (2030)</i>								
	Investment costs (thousands of euro)	Mobility / internal market (no. of workers)	Safety (thousands of euro)	Administrative costs(thousands of euro)	Employment /job creation (no. of jobs)	Job quality/ attractiveness (qualitative)	Impact on SMEs (qualitative)	Third countries (quantitative)
Criteria for checking the necessity of any given KSS/ Minimum standards of exams related to acquiring of KSS /	0	++	0	676	0	0/+	+	0



12.4 Problem driver 4 Difficulties with the recognition by national authorities of Service Record Books (SRBs) or of the information contained in the SRB's

<i>Problem driver 4 Difficulties with the recognition by national authorities of Service Record Books (SRBs) or of the information contained in the SRB's (2030)</i>								
	Investment costs (thousands of euro)	Mobility / internal market (no. of workers)	Safety (thousands of euro)	Administrative costs (thousands of euro)	Employment / job creation (no. of jobs)	Job quality/ attractiveness (qualitative)	Impact on SMEs (qualitative)	Third countries (qualitative)
Harmonisation of required information contained in Service Record Books and mutual recognition of Service Record Books	0	4,861w	+	120	0	+	0	0
Harmonisation of required information required in logbooks & mutual recognition of the logbooks	0	0	0	10	0	0	+	0
Electronic SRB and electronic logbook Big bang	--	+	0	22,360	0	++	+	491
Electronic SRB and electronic logbook Gradually (in 10 years)	--	0	0	12,567	0	0	+	236



12.5 Problem driver 5 The standards for IWT education set at national level have not kept up with technological development

Problem driver 5 The standards for IWT education set at national level have not kept up with technological development (2030)									
		Investment costs (thousands of euro)	Mobility / internal market (no. of workers)	Safety (thousands of euro)	Administrative costs(thousands of euro)	Employment /job creation (no.of jobs)	Job quality/ attractiveness (qualitative)	Impact on SMEs (qualitative)	Third countries (qualitative)
Voluntary option: introduction of a certification system for IWT schools to ensure quality of teaching (STCIN)		-324	0	18,204	-6,518	0	+	0	-268
Mandatory option	Mutual recognition of diplomas	0	++	0	0	0	+	0	0
	Introduction of EU wide minimum standards for the exams	-950	+	20,360	-8,393	0	+	0	-636



12.6 Problem driver 6 Language problems

Problem driver 6 Language problems (2030)									
		Investment costs (thousands of euro)	Mobility / internal market (no. of workers)	Safety (thousands of euro)	Administrative costs(thousands of euro)	Employment /job creation (no.of jobs)	Job quality/ attractiveness (qualitative)	Impact on SMEs (qualitative)	Third countries (quantitative)
Voluntary implementation of river speak. Standard Inland Navigation Communication Phrases (SINCP)		-926	0/+	974	-694	0	+	0	-7
Mandatory implementation	in IWT education	-926	+	455	-694	0	++	0	-7
	in IWT education plus additional examination for those acquiring professional qualifications trough the experience based path	-926	+	630	-1,205	0	++	0	-34
	in the exam program linked to boatmaster certificates	-926	+	470	-884	0	++	0	-11
	in the EU wide minimum requirements for all crew	-5,204	++	7,991	-1,205	0	++	0	-328
	in the EU wide minimum requirements for boatmasters only	-2,523	++	6,806	-884	0	++	0	-94



13 Option: reinforced cooperation through CCNR bilateral and multilateral agreements

13.1 Introduction

The bilateral and multilateral agreements between CCNR and countries involved have been effective¹⁷⁷. Therefore, an option to consider is the possibility of extending the current system of reinforced cooperation to further harmonise and modernise in Europe the system of professional qualifications in inland navigation. Potentially other Member States and more topics can be covered.

So far, CCNR has established seven bilateral agreements on mutual recognition of boatmasters' certificates and one multilateral agreement on the mutual recognition of Service Record Books:

- CCNR has recognised the national boatmasters' certificates of seven European States that are not CCNR members, i.e. Austria, Bulgaria, Hungary, Poland, Romania, Czech Republic and Slovakia. Further, CCNR also recognised the national boatmasters' certificates of three CCNR member States, i.e. Belgium, Germany and the Netherlands.
- The multilateral Administrative Arrangement was signed by the CCNR and the competent ministries of the same seven central European States. The signatories agreed to mutually recognise the SRB issued by their respective competent authorities.

13.2 Additional countries that can possibly be involved

The process of bilateral recognition is open for third countries. For example, Croatia has demanded to join on 28 November 2013. A decision to join agreements is made on a voluntary basis¹⁷⁸.

It should be underlined that not all CCNR members and observer states are part of the mutual recognition agreements. The decision to join the agreement is made on a voluntary basis, and can only be made by States whose regulations have National Regulation close or inspired from Rhine regulation. Indeed, to join countries need to base their national regulations on the Rhine regulations and therefore balance the effects of this against the benefits of joining the agreements.

France, for example, has decided not to participate due to a set of differences between the French and CCNR system. The decision not to join can also easily be understood for a country like the United Kingdom or others, being distant from the Rhine. The reason why Switzerland is not included is that, apart from Rhine patent, there are only boatmasters' certificates with a local validity.

Apart from Croatia and potential future new EU member states, it is likely that other EU member states decide to stay outside of the CCNR system of mutual recognition.

¹⁷⁷ Panteia et al. (2013), Evaluation of the framework of relevant directives related to the initiative on recognition and modernisation of professional qualifications in inland navigation, <http://ec.europa.eu/transport/facts-fundings/evaluations/doc/2014-03-evaluation-report-directive-1996-50.pdf>

¹⁷⁸ Possible EU countries to be further involved, and that are not part of the agreements, could be: France, United Kingdom, Sweden, Italy, Switzerland. Non-EU countries could be Serbia, Bosnia-Herzegovina, Moldova, Ukraine. It must be stressed that in principle any country can join.



13.3 Additional fields to be covered

The current process of mutual recognition is based on the acknowledgement of the boatmasters' certificates and SRBs¹⁷⁹.

Mutual recognition is therefore based on an administrative procedure with focus on equivalence of applicable rules and programs of exams and not (yet) on required competences and the validity of exams to measure this. As such, the current mutual recognition has limitations in providing insight in genuine professional qualifications. As a consequence, the system does not provide insight in the (true) competences of staff on-board the vessel and does not allow setting uniform skill levels within the countries concerned. The acknowledgement of certificates can therefore be extended to an assessment of competences of boatmasters as well as crew members.

In this line, in order to ensure sufficient availability of manpower and to permit the acquisition of comparable skills, the process of mutual recognition of the professional qualifications of boatmen obtained by attending a training course, listed in a recognised service record book has been initiated with Romania and Czech Republic. The audit carried out in the training establishment requesting the recognition may refer, for example, to Platina Deliverable 3.13 regarding the operational level. Although at this stage the process is intended to be limited to these two countries, it could be envisaged, in the absence of an EU framework, that other countries could join and other functions that boatmen are covered. However at most it would remain limited to the countries participating to the multilateral agreement for the recognition of the SRB.

13.4 Positive impact of an extension

In general, an extension of the system of reinforced bilateral and multilateral cooperation would particularly in the short-term perspective, form an efficient transition when coming from the BAU situation. The existing initiatives that have proven their effectiveness may be used here to take further steps towards a more harmonised system, for example on the area of training. It would lead to increased benefits in terms of an *improved labour mobility and an improved safety*¹⁸⁰: process of mutual recognition enables a free movement of workers and where competences are geared to the situation in the IWT sector this positively affects safety. Also *job quality and job attractiveness* will be enhanced. These benefits will be further enhanced when a greater coverage is realised, by the participation of more countries in the agreements.

Compared to BAU, from the sector perspective, as a result of the agreements, savings may be realised in terms of *administrative burden*, for example control authorities, and workers, not needing additional documents. From a governance perspective, as the system is merely of an administrative nature, the required input in terms of person days is relatively small.

¹⁷⁹ For example, all service record books covered by mutual recognition contain a page reserved for the listing of qualifications obtained in compliance with Rhine regulations. Currently, this page may only be filled in by a competent Rhine authority and the qualification listed on this page is the only qualification valid on the Rhine. To list the qualification in compliance with Rhine regulations, the competent Rhine authority takes account of the number of years of experience the boatman has, as attested by his service record book.

¹⁸⁰ Panteia et al. (2013), Evaluation of the framework of relevant directives related to the initiative on recognition and modernization of professional qualifications in inland navigation



13.5 Inherent limits of the system and therefore negative impact at EU level

- As explained above, currently, not all CCNR countries and observer states are part of the recognition system. It means that even in the future it is not likely that the system of multilateral/bilateral cooperation will attract many countries. From an EU geographical perspective, this is suboptimal. Remain in Europe various systems of harmonisation with different level of standards, including a system managed by the Rhine authorities for the Rhine (and countries participating in the agreements with CCNR) and a system for other European Member States. Noting also that within the latter group, although there is a mutual recognition established for boatmasters' certificates under Directive 96/50/EC, they are many differences in the way the EU countries apply the Directive.
- From an investment/administrative burden point of view, though the required input in terms of person days is relatively small, the recognition process is based on an individual request and is a very lengthy procedure due to a thorough assessment of each individual dossier, with potential necessary adjustments in the system of the requesting party.
- The arrangements do not constitute a treaty or international agreement under public international law, involving the international responsibility of the contracting administrations as states or of the CCNR as an international organisation. There are obligations to discuss and to inform, final decision making remains with the signatory parties (CCNR and contracting countries). The administrative arrangements urge the signatory States to change their regulation in a coordinated fashion. In particular, they should inform each other before enacting significant changes in their regulation (art. 6). If a change is made in an uncoordinated way, it could justify denunciation of the arrangement under art. 7. Experience is yet too short to evaluate whether this system will suffice to urge States to modernise their regulation in a coordinated way. Other mutual recognition systems have however shown their limits overtime when it came to modify/modernise the regulation. Mutual recognition is thus often a first step towards harmonisation. In view of the need for modernisation in this field (cfr. use of simulators, e-tools,...), a similar need appears for qualifications as stressed in the NAIADES II Communication. Modernisation is expected to create positive impact both on safety and on the attractiveness of the profession.
- Linked to the above point the procedure makes it possible that one of the countries involved (CCNR member states and the country with which the agreement is concluded) can state that one of the parties does not fulfil the conditions of the agreement anymore. It is possible to denounce the convention if new regulation is considered not equivalent but first a negotiated issue will be searched. The basis for this challenge is objective but could show a certain complexity of "proving" non-equivalent performance.

By the nature of the administrative arrangements, the above limits will remain regardless of the modernisation and extension of this system.



13.6 Summary table comparing effects

In the following Table 13.1, a summary is presented of how Reinforced Cooperation and the other approaches compare to BAU.

Table 13.1: Summary of impact of approach with reinforced cooperation and EU directive

<i>Methodology</i>	<i>Ability to harmonise in the short run</i>	<i>Ability to represent EU as a whole</i>	<i>Final country Penetration</i>	<i>Adjustment/ enforcement</i>	<i>Investment costs of measures</i>	<i>Ability to include modernisation aspects</i>
BAU (Directives + CCNR bilateral/multilateral cooperation)	0	0	0	0	0	0
Reinforced Bilateral/multilateral Cooperation	+	0/+	0/+	0	-	0/+
EU Harmonisation via new legislative instrument	0	+	+	+	-	+

Source: Panteia

Generally, it can be concluded that Reinforced Bilateral Cooperation provides the best opportunities to further harmonise in the short run, while the limitations of this approach make that in the longer run it is better to follow an EU Harmonisation approach.

By the CCNR, the agreements on mutual recognition are seen as a transitional step towards a new EU initiative and harmonized standards with Rhine regulation on the same scheme as for technical prescription actually discussed in Parliament.



14 Conclusions and recommendations

In general, it can be concluded that levelling labour market barriers is needed to bridge the gap between the demand and supply of workers in inland navigation in the long run. As there may be intertemporal differences in surpluses and shortages in different regions, mobility between regions may contribute to this. Additionally, inflow from other sectors could help. Practical exams and the use of simulators can help increasing the attractiveness of a job in inland navigation. The measures proposed aim at harmonisation in order to have an efficient mechanism to exchange workers between regions.

However, forecasts show that on a EU level in the long run the gap between demand and surplus is considerable on the inland navigation labour market. Enlarging the inflow via training institutes or an experience path is of paramount importance to pursue a balanced labour market in the long run. Adequate job attractiveness is an important key driver here in order to make more people choose for a career in inland navigation.

In the following sections, conclusions will be drawn for every problem driver, and corresponding measures. Where relevant, recommendations will be given regarding implementation of the measures.

14.1 PD 1: Difficulties with mutual recognition of professional qualifications of workers from within the IWT sector

Aligning an EU system on CCNR standards has positive effects on safety, but on the other hand, job mobility is more hampered as successfully finishing education will only be granted with two years of professional experience instead of three. This lengthens the path to boatmaster by a year. Moreover, the corresponding costs for the IWT sector are higher compared to an alignment regarding current EU-standards. For the latter, the reverse effect can be observed.

Measures regarding the mutual recognition and harmonised requirements for both boatmasters and operational workers show the highest benefits in terms of safety, job mobility and job satisfaction and attractiveness. For mutual recognition of functions in case the corresponding competences differ there is trade-off effect between job mobility and safety. There is a number of measures where this trade-off may be observed. In general, CCNR measures may often have positive effects on safety, but on the other hand, these measures score less on job mobility as successfully finishing education will only be granted with two years of professional experience instead of three. This lengthens the path to boatmaster by a year and thus, the economic costs for the IWT sector are higher compared to the EU-approach. For EU measures, the reverse effect can be observed. However, an experience path, combined with education and a practical exam may result in personnel of which the competencies can better be guaranteed than in the case of only four years of sailing time.

The Mutual Recognition of professional qualifications of personnel from Middle- and Eastern Europe will not have significant effects on safety. Currently, the gap between the demand and supply of boatmasters on the Rhine corridor is bridged by persons from the hidden reserve (mostly retired boatmasters). In the Problem Definition report, it has been concluded that boatmasters from Non-CCNR countries have higher



accident frequencies, but these are comparable to the persons from the hidden reserve, as these are usually older and therefore more accident-prone to perform their duties according to accident statistics and research.

Measures regarding minimum experience show significant trade-off effects between job mobility and safety except where a competence-based approach is adopted. Also, these measures have a trade-off effect on either the labour market for boatmasters and operational workers. Applying the EU Directive on the Rhine will have a positive effect on the number boatmasters, but these boatmasters were under CCNR-regulations deployed as helmsmen and did thus contribute to the labour market of operational workers.

To a lesser extent the measures regarding medical examinations are effective. The CCNR-standards are the best in terms of safety, but cause higher costs to the sector for medical examination than the other approaches. Extending the current EU-standards has a slightly more negative effect on safety, but the costs for the sector are smaller. Lastly, the Dutch proposal has the least performance with regards to safety but the best on costs avoided for the sector.

Certificates for vessels between 20 and 40 metres and for large convoys are providing no significant benefits in terms of mobility and safety. Investments costs are calculated as very low, however. The certificates for vessels between 20 and 40 metres have benefits with regards to job satisfaction. There are synergy effects between the measures on minimum age and the boatmaster certificate for vessels between 20 and 40 metres. At this moment, for graduates from IWT training schools in France and the Netherlands, it is directly possible to be a boatmaster on such a vessel. The positive effects of allowing boatmasters to get a certificate for vessels between 20 and 40 metres will diminish if young boatmaster are not able to navigate on these vessels because they do not meet the age requirements.

Lastly, there is an overlap between measures that concern certificates for helmsmen and engineers and measures that concern operational workers in general. Benefits and/or costs should therefore not be added for the full 100%.

14.2PD 2: Difficulties with mutual recognition of relevant professional experience of workers from outside the sector (e.g. maritime sector)

Measures regarding difficulties with mutual recognition of relevant professional experience of workers from outside the sector will probably motivate few additional workers to undertake a career switch. Benefits are therefore small. However, investment costs are virtually zero and a small but steady inflow from workers outside the sector can contribute to filling gaps on the IWT labour market in the long run. Being low-cost measures, these measures can be taken in addition to other measures.

14.3PD 3: Knowledge of specific situations (KSSs) may prevent boatmasters from sailing on a certain stretch

Safety is the primary reason for requirements concerning KSS. However, it is difficult to determine quantitatively how KSS actually contribute to an increased safety. Across Europe, the nature of the requirements within the context of KSS may vary greatly. Some of the measures encountered are very specific to the stretch that they are valid on: i.e. medical check-ups once every three years (Maritime Seine), only theoretical examination without having actually sailed on the relevant stretch (Danube



requirements for lower Danube countries, or holders of a Rhine patent for some stretches in Romania. Conversely, the demand for a large number of working experience on a stretch (Gironde river in France).

The possibility for a candidate to have KSS exams in the country of origin provides benefits in terms of reduced travel time and being able to do the exam in one's native language. Thus, uneven barriers for candidates from different countries are levelled. However, the number of workers affected is small.

The application of simulators can provide useful support to training and examination regarding KSS. Simulators enable testing of unusual situations that occur infrequently or dangerous situations that cannot be tested in real life. This might help in tackling the problem due to aging pilots, which might hamper inland navigation on certain rivers in the near future.

It is recommended to conduct risk assessments for the various KSS stretches within Europe in which both accident probability as well as possible impact of accidents are investigated. Risk reducing measures, such as KSS, can then be balanced against the risk standards that are needed on the respective river stretches.

14.4 PD 4: Difficulties with the recognition by national authorities of Service Record Books (SRBs) or of the information contained in the SRB's

Although the investment costs for a central registration and access are not yet known, the benefits of introducing e-SRB and e-logbooks are such that they seem a profitable investment, especially because also important addition benefits can be realised with regarding to the protection against loss or theft of service record books. Further, a substantial gain may be realised in reducing the administrative burden for the stakeholders.

Also fraud is combated by using this approach. Reduction of fraud with SRBs creates a better levelled paying field. Furthermore, as unqualified workers are kept out, there also may be an improvement of safety.

E-SRB and e-logbook should preferably be implemented together and the transition period should be short, in order to avoid unclear situations where paper and electronic systems co-exist. It is recommended to perform a more in-depth investigation of the investment costs needed for implementing e-SRB's or e-Logbooks.

14.5 PD 5: The standards for IWT education set at national level have not kept up with technological development

A conservative approach regarding the benefits of IWT education that is targeted to safety issues proves benefits in terms of accidents avoided.

Even in case of a rather low penetration rate of harmonised training and education standards, the measures show significant benefits.

It is recommended to continue further implementation of this measure. Much work is already done under STCIN, therefore the upfront investment costs of measures to take, seem limited. Both a mandatory approach and a voluntary approach by the sector show benefits.



14.6 PD 6: Language problems

Measures on the introduction of Riverspeak show benefits, although lower than in the case of measures on training that are safety oriented (PD 5).

Measures regarding the introduction of the use of a common language need a rather high penetration rate in order to show significant benefits

EU-wide minimum requirements for all show high benefits, but may be combined with high investment costs for training of all crew. Reasonably lower investment costs and administrative costs are imposed against negligible lower safety benefits, if minimum requirements are only set at boatmaster level. While a voluntary implementation also offers reasonable benefits, it does not require an uncertain and potentially high investment in language courses for the IWT sector and land-based workers.



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Terms and descriptions

Terminology that has been used in the report text, is explained in the table below.

Term	Description
Administrative burden	<p>Administrative costs are the costs incurred by enterprises, the voluntary sector, public authorities and citizens in meeting legal obligations to provide information on their activities (or production), either to public authorities or to private parties.</p> <p>A distinction must be made between information that would be collected by an entity even in the absence of the legislation and information that would not be collected without the legal provisions. The costs generated by the latter type of information are often called administrative burdens.</p>
Boatmaster	A person with the responsibility associated with serving as captain or skipper on board of inland waterway ships and ensuring that all functions within the designated area of responsibility are properly performed.
Directive 96/50/EC	Council Directive 96/50/EC of 23 July 1996 on the harmonisation of the conditions for obtaining national boatmasters' certificates for the carriage of goods and passengers by inland waterway in the Community.
EU legal instrument	The instruments available to the European institutions to carry out their tasks are listed EU Treaty. The relevant instruments for this initiative are: (i) regulations: these are binding in their entirety and directly applicable in all Member States; (ii) directives: these bind the Member States as to the results to be achieved; they have to be transposed into the national legal framework and thus leave margin for manoeuvre as to the form and means of implementation.
Hidden Reserve	The hidden reserve can be defined as often retired IWT workers that are deployed on an incidental basis.
Internal market	The establishment of an 'internal market' (i.e. an area without internal frontiers in which the free movement of goods, persons, services and capital is ensured) is a central objective of the European Union. This requires, among other things, the harmonisation of rules set at Member State level.
Job quality	The term 'job quality' refers to a range of inter-connected employment concerns, including job satisfaction; remuneration levels; job security; social protection; safety and health concerns; human resource development; management and organisation; and freely chosen employment.
Labour mobility	Labour mobility is the movement of workers between EU member states allowing workers to perform duties on vessels sailing in the EU inland waterway system without restriction ¹⁸¹ .

¹⁸¹ See also 'free movement of workers' website: <http://ec.europa.eu/social/main.jsp?langId=en&catId=457>



Term	Description
Logbook	The logbook is a mandatory document for each inland vessel or other vessel that commercially and independently navigates on inland waterways, with the exception of tugs, pusher craft, unmanned barges, government vessels and recreational craft, that remain solely in the ports. The sailing times logbook includes amongst others, the registration of the sail and rest times, the number of crew and their positions. The logbook is applied for by the owner / operator of the ship.
Knowledge of Specific Situations (KSS)	Specific knowledge required on a river section which goes beyond the knowledge obtained through the regular training and certification processes.
PLATINA	The PLATINA project is a major trans-European project for the promotion of inland navigation. Launched by the European Commission on 1 October 2008, PLATINA was designed as a platform to provide support for the implementation of the NAIADES European inland navigation programme. More on http://www.naiades.info/platina .
Professional qualifications	A license or patent earned by a person to assure qualification to perform a job or task. The document is issued by a Member State or a River Commission allowing a worker to operate in a vessel working on inland waterways.
Service Record Book (SRB)	Personal (held) register with qualification, physical and mental fitness and service time. A paper way of a worker recording detail of the work history.
Small and medium-sized enterprises (SME)	Enterprises which employ fewer than 250 persons and which have an annual turnover not exceeding 50 million Euro, and/or an annual balance sheet total not exceeding 43 million Euro.
River Speak	A standardised language that can be used on all European waterways and can be helpful especially if there are situations of misunderstanding. It can consist of navigation terms, both ship-ship and ship-shore, as well as of intra-ship communication, e.g. from nautical to social speak.
Electronic Service Record Book (e-SRB)	An electronic form of a Service Record Book. Like the traditional SRB, the e-SRB also includes information on qualification, physical and mental fitness and service time. Currently there is not yet a standard for an e-SRB. However, initial systems are developed and tested that are based on a device that can be logged on to by the skipper or the crew member through an on board terminal (GPS), which is linked to a personal webpage in a central server. The connection to the server will be encrypted to guarantee high level of data protection. Data like sailing time, rest time and travels made, will be gathered automatically and transmitted to the central server.



Abbreviations

Abbreviations used in the report text, are presented in the table below.

Abbreviation	Description
AE	Alignment of Exams
AT	Austria
BAU	Business As Usual
BE	Belgium
BM	Boatmaster
CAO	Collectieve Arbeidsovereenkomst
CCNR	Central Commission for the Navigation of the Rhine
CESTE	European Committee for the Creation of Technical Standards in the field of inland navigation
CH	Switzerland
CPI	Consumer Price Index
CZ	Czech Republic
DC	Danube Commission
DE	Germany
DG MOVE	Directorate General for Mobility and Transport
EBU	European Barge Union
EC	European Commission
ECDIS	Electronic Chart Display Information System
ELWIS	Electronic Waterways Information System
EDINNA	Education in Inland Navigation
ESO	European Skippers Organisation
e-SRB	Electronic Service Record Book
EU	European Union
FR	France
HINT	Harmonised Inland Navigation Transport through education and information technology
HR	Croatia
HU	Hungary
ICT	Information and communication technology
ISRBC	International Sava River Basin Commission
ILT	Inspectie voor Leefomgeving en Transport
IT	Italy
ITB	Instituut voor Transport over de Binnenwateren
IWT	Inland Waterway Transport
KSS	Knowledge of Specific Situations
MR	Mutual Recognition
NA	Not Available



Abbreviation	Description
NAIADES	Navigation and Inland Waterway Action and Development in Europe
NL	Netherlands
NPV	Net Present Value
NUTS	Nomenclature of territorial units for statistics
PTC	PLATINA competencies tables
RO	Romania
RPN	Regulations for Rhine navigation personnel
SB	Serbia
SK	Slovak Republic
SME	Small and Medium-Sized Enterprises
SRB	Service Record Book
STF	Committee on Social issues, Employment and Professional Training
UK	United Kingdom
UNECE	United Nations Economic Commission for Europe
VAT	Value Added Text
VHF	Very High Frequency



Knowledge of specific situations in Europe

Country	Stretch	Required knowledge / experience	Procedure
Austria	a) Km 2094,5 (Wallsee)– km 2060,4 (Persenbeug) (b) Km 2032.8 (Melk)– km 1979,8 (Altenwörth) (c) Km 1921 (Wien– Freudenau)–the Austrian–Slovak border	16 trips on the respective stretch (8 upstream, 8 downstream)	Experience is shown through service booklet
Bulgaria	Danube (E 80) – total of 11 stretches	At least 16 runs for each sector of Danube for which the certificate is delivered.	Several examinations, including a written test.
Croatia	All of Danube (E80) Km 1433–km 1295.5	16 trips on the respective stretch (8 upstream, 8 downstream)	Experience is shown through service booklet and take exam
	Sava (E80-12)	16 trips on the respective stretch in the last 3 years (and 3 times in each direction in the last 3 years) plus local conditions and regulations.	Experience is shown through service booklet and take exam
France	Rhine (E 10). There is a 18 km stretch of the Rhine at the border with Germany between Iffezheim and Lauterbourg		
	Seine Maritieme (E80) – Km 260.100 to Atlantic Ocean, a total of five stretches	For barges or convoys with a length smaller than or equal to 135 metres: at least 12 trips on the respective stretch in the last year prior to the exam, plus local conditions and regulations. For barges or convoys with a length greater than to 135 metres: at least 20 trips on the respective stretch in the last year prior to the exam, plus local conditions and regulations.	Experience is shown trough service booklet and take exam. If the applicant passes the exam, his license will be valid for a maximum of three years. In order to renew the license, at least 6 trips on the respective stretch should have been made in the past three years, of which at least 2 in the last year prior to renewal for barges with a length smaller than or equal to 135 metres. For barges larger than 135 metres, at least 12 trips should have been made on the respective stretch in the last three years, of which at least 4 in the last year prior to renewal. Besides, a proof of physical and mental fitness, not being older than three months, should be provided in order to renew the



Country	Stretch	Required knowledge / experience	Procedure
			license.
	Harbour of Marseille-Fos and connecting channels to the Rhône (E10) ¹⁸²	10 trips on the respective stretch/area in the last year prior to the exam, plus local conditions and regulations.	<p>Experience is shown through service booklet and take exam.</p> <p>The Local Knowledge Certificate will be valid for a year. In order to renew this license, the applicant should have made at least five trips in the year prior to renewal.</p> <p>Besides, a proof of physical and mental fitness, not being older than three months, should be provided in order to renew the license.</p>
	Gironde river	<p>For vessels with a length smaller than 50 metres and a maximum draught less than 3 metres, six trips on the respective stretch, from which two should be made in the period six months prior to the exam.</p> <p>For vessels with a length between 50 and 90 metres, a maximum draught of 4 metres and a height higher than 1.8 metres, 36 trips on the respective stretch in the last two years prior to the exam, of whom 12 of them should be made in the last six months prior to the exam and six of those should be made from the one end of the zone to the other end.</p>	<p>Experience is shown through service booklet and take exam.</p> <p>The Local Knowledge Certificate will be valid for three years. In order to renew this license, the applicant should have made at least 36 trips in the last three years.</p> <p>Besides, a proof of physical and mental fitness, not being older than three months, should be provided in order to renew the license.</p>
	Loire river	12 trips on the respective stretch/area in the last six months prior to the exam.	<p>Experience is shown through service booklet and take exam.</p> <p>The Local Knowledge Certificate will be valid for a year. In order to renew this license, the applicant should have made at least twelve trips in the year prior to renewal.</p> <p>Besides, a proof of physical and mental fitness, not being older than three months, should be</p>

¹⁸² For vessels with a length smaller than 70 metres and not transporting hazardous cargoes, no Local Knowledge Certificate is needed. For vessels transporting hazardous cargoes, this limit is 50 metres.



Country	Stretch	Required knowledge / experience	Procedure
			provided in order to renew the license. Only applicants aged between 21 and 55.
Germany	Rhine (Iffezheim - Spijksche Veer);	16 trips on the respective stretch in the last 10 years (and 3 times in each direction in the last 3 years) plus local conditions and regulations.	Experience is shown through service booklet and take exam
	- Elbe (Schöna - Hamburg Port); - Weser (Hannover-Münden - Oberweser); - Danube (Vilshofen - Straubing); - Untere Havel-Wasserstraße (Plaue - Havelberg), if water at Unterpegel Rathenow is above 130 cm; - Oder (Ratzdorf - Widochowa); - Saale (Elbe - Calbe).	16 trips on the respective stretch in the last 10 years (and 3 times in each direction in the last 3 years).	Experience is shown through service booklet
Hungary	All of Danube (E80) Km 1811–km 1433	16 trips on the respective stretch (8 upstream, 8 downstream) plus local conditions and regulations. Half of the practice should be carried out in the quality of helmsman and within 18 months prior to the examination	Experience is shown through service booklet and take exam. Use of interpretation is allowed.
Poland	Odra River (Gliwice channel to maritime water)	16 trips on the respective stretch (8 upstream, 8 downstream) in the last five years plus local conditions and regulations.	Experience is shown through service booklet and take exam.
	Vistula River (mouth of river Przemsza to maritime water)		
	Warta River (from the mouth of the Canal Ślesińskie Noteci)		
Romania	Danube (E80) a) Oberer Kazan (km 974) – Orsova (km 954) b) Prachovo (km 863) – Black Sea	At least 16 runs for each sector of Danube for which the certificate is delivered.	Experience is shown through service booklet and take exam
Serbia	Danube (E80) a) Croatian border – Belgrade (km 1166) b) Veliko Gradište (km 1059) – Joc (km 1038) c) Oberer Kazan (km	16 trips on the respective stretch (8 upstream, 8 downstream)	Experience is shown through service booklet and take exam



Country	Stretch	Required knowledge / experience	Procedure
	974) – Orsova (km 954) d) Prachovo (km 863) – Romanian border		
	Sava (E80-12)	16 trips on the respective stretch in the last 3 years (and 3 times in each direction in the last 3 years) plus local conditions and regulations.	Experience is shown through service booklet and take exam
Slovakia ¹⁸³	1) Austrian – border stretch 2) Hungarian border stretch	At least 16 runs for each sector of Danube for which the certificate is delivered.	Experience is shown through service booklet and take exam
Schweiz	Basel - Augst	16 trips on the respective stretch in the last 10 years (and 3 times in each direction in the last 3 years).	Experience is shown through service booklet
	Augst – End of Rhine	8 trips on the respective stretch (4 upstream, 4 downstream in the last two years).	Experience is shown through service booklet
United Kingdom	Tidal River Thames (Putney Bridge - eastern limit of the Thames Barrier Control Zone)	6 months / 60 days of service, including work in different directions, in varying conditions and darkness Local conditions and regulations	Show experience through service booklet and take exam
	Portsmouth Harbour Isles of Scilly	6 months / 60 days of service Local conditions and regulations	Show experience through service booklet and take exam
	Padstow Harbour	6 outward, 6 inward journeys under supervision of a Harbour Authority representative Local conditions and regulations	Show experience through service booklet and take exam
	Bristol Port Caernarfon and Menai Strait Dee Conservancy Dover Harbour Fowey Harbour Gloucester Harbour Port of Liverpool Teignmouth	Local conditions and regulations	Take exam

Source: Combination of Europe Economics (2009) and UNECE (2010), Sava Commission (2011) and the authorities in Croatia and Slovakia (2014)

¹⁸³ On the 56 kilometre stretch that is entirely in Slovakia, there are no KSS requirements.



Appendix 2 **Process of mutual recognition and mechanism of implementation**

The Central Commission for Navigation on the Rhine (CCNR) plays an important role in the agreements on mutual recognition.

CCNR Member States have the possibility to adopt common regulations. These regulations are designed to:

- Ensure uniform regulations for the entire navigable length of the Rhine;
- Stimulate the safety of navigation on the Rhine, for both people and the environment;
- Provide qualifications and a social framework suited to the people working in navigation on the Rhine.

Even though CCNR regulations are designed for the Rhine, in a number of cases, including in the case of regulations for crew and staff, the contents of the regulations were used as a basis to be applied to other river basins as well. As such, the CCNR is a pioneer in developing regulations and setting standards. In the 'Evaluation of the framework of relevant directives related to the initiative on recognition and modernisation of professional qualifications in inland navigation'¹⁸⁴, an analysis is presented of the process of mutual recognition and the mechanisms of implementation of measures. The text below is based on this analysis.

So far, CCNR has established bilateral agreements on mutual recognition of boatmaster certificates' and one multilateral agreement on the mutual recognition of Service Record Books. Joining the agreements is on a voluntary basis and can only be made by states with national regulation close and/or inspired from the Rhine regulation. The need to adjust national regulations may therefore be an obstacle for joining the agreements in case current national regulations are not based on Rhine regulations. For example, the United Kingdom, the effort of adjusting the national regulations is probably not justified by the benefits of joining the agreements. Further, France not participating is based on a set of differences between the French and CCNR system. Differences include: (i) definition of one year of navigation (France: 100 effective days, Rhine: 180 effective days); (ii) in France, a SRB is not mandatory and is only used to record experience time for justification of becoming a boatmaster, whereas a SRB on the Rhine is mandatory; (iii) there are limited number of ranks in France, only boatmaster, boatman or deckhand while on the Rhine, there are seven sailing ranks and one technical rank; and (iv) in France, logbooks are not mandatory, whereas logbooks are mandatory on the Rhine. Switzerland is not included because, apart from Rhine patent, there are only boatmaster certificates with a local validity.

Austria, France, the Netherlands, Germany, as well as CCNR and the Danube and Sava Commission provided feedback¹⁸⁵ on the process of mutual recognition. All respondents state that

- agreements have been effective in recognition of boatmasters' certificates and SRBs on the Rhine. However, there are limitations to the process of mutual recognition.

¹⁸⁴ Panteia et al. (2013), Evaluation of the framework of relevant directives related to the initiative on recognition and modernisation of professional qualifications in inland navigation, <http://ec.europa.eu/transport/facts-fundings/evaluations/doc/2014-03-evaluation-report-directive-1996-50.pdf>

¹⁸⁵ *Ibid.*



- recognition works from a Rhine perspective, not from a Europe wide perspective.
- Some conditions are considered administrative barriers, including (i) the local knowledge of the river Rhine can only be certified by the member states of CCNR; (ii) the SRB itself is recognised, but the qualifications in the SRB are not recognised (only CCNR member states are allowed to certify a qualification for the river Rhine; (iii) the ship logbook issued by a non-CCNR member state even if based on Rhine prescriptions is not automatically recognised. For example, a vessel with an Austrian logbook needs a second logbook which has to be signed by a CCNR member state for the river Rhine.
- mutual recognition is based on an administrative procedure with focus on equivalence of applicable rules and programs of exams and not (yet) on required competences and the validity of exams to measure this. As a consequence, the system does not provide insight in the (true) competences of staff on-board the vessel and does not allow setting uniform skill levels within the countries concerned.
- mutual recognition systems have their limits in adjusting regulations. This is why mutual recognition systems are often replaced by a harmonisation system in the long run. Mutual recognition is thus often a first step towards harmonisation.

The majority of respondents state that the system of mutual recognition is (relatively) efficient. From a governance perspective, as the system is merely of administrative nature, the required input in terms of person days is relatively small, i.e. some two meetings per year. From the sector perspective, if the system works, savings can be made in terms of administration, for example control authorities, and workers, not needing additional documents. Some comments are, however:

- the process to come to recognition can be lengthy.
- the system comes with administrative barriers, as listed above, resulting in additional costs.

The current agreements on mutual recognition provide an improvement as compared to the situation prior to the agreements on mutual recognition. The agreements between CCNR and countries involved are based on the river Rhine as point of departure. This has resulted in a dual system, comprised of a system for the Rhine (and countries participating in the agreements with CCNR) on the one hand and a system for other European Member States on the other hand. From the perspective of the Rhine, the system is effective, as indicated above. However, from a European perspective, the system of mutual recognition has its limitations. Taking the above into account, most parties see the process of mutual recognition as a transitional solution, i.e. a step towards a new EU Directive.



<i>Region</i>	<i>Tonkilometers¹⁸⁶</i>	<i>Transport Costs</i>
Austria	5,158,541,667	€ 65,054,715
Baden-Württemberg	6,894,875,000	€ 86,951,732
Basse-Normandie	1,000,000	€ 12,611
Bayern	3,499,083,333	€ 44,127,175
Belgium	21,978,583,333	€ 277,173,390
Berlin	640,000,000	€ 8,071,083
Bourgogne	183,000,000	€ 2,307,825
Brandenburg	325,000,000	€ 4,098,597
Bremen	619,000,000	€ 7,806,251
Bulgaria	1,170,000,000	€ 14,754,949
Centre (FR)	2,000,000	€ 25,222
Centre-Est (FR)	564,000,000	€ 7,112,642
Champagne-Ardenne	78,250,000	€ 986,816
Croatia	211,000,000	€ 2,660,935
Czech Republic	128,000,000	€ 1,614,217
Est (FR)	5,037,375,000	€ 63,526,674
Hamburg	803,000,000	€ 10,126,687
Haute-Normandie	1,398,541,667	€ 17,637,103
Hessen	2,721,083,333	€ 34,315,765
Hungary	1,896,000,000	€ 23,910,583
Île de France	2,111,500,000	€ 26,628,268
Luxembourg	411,666,667	€ 5,191,556
Mecklenburg-Vorpommern	2,000,000	€ 25,222
Méditerranée	627,958,333	€ 7,919,225
Netherlands	32,548,041,667	€ 410,465,539
Niedersachsen	3,572,041,667	€ 45,047,257
Nord - Pas-de-Calais	981,708,333	€ 12,380,390
Nordrhein-Westfalen	19,144,291,667	€ 241,429,948
Ouest (FR)	31,666,667	€ 399,350
Picardie	216,125,000	€ 2,725,567
Poland	159,541,667	€ 2,011,991
Rheinland-Pfalz	5,148,041,667	€ 64,922,299
Romania	7,621,000,000	€ 96,108,943
Saarland	1,583,791,667	€ 19,973,303
Sachsen	30,000,000	€ 378,332
Sachsen-Anhalt	1,047,541,667	€ 13,210,618
Schleswig-Holstein	313,000,000	€ 3,947,264
Serbia	3,684,000,000	€ 46,459,171
Slovakia	147,000,000	€ 1,853,827
Sud-Ouest (FR)	3,000,000	€ 37,833
Switzerland	3,528,333,333	€ 44,496,049
Thüringen	1,000,000	€ 12,611
Ukraine	472,000,000	€ 5,952,424
Total	136.693.583.335	€ 1.723.851.959

¹⁸⁶ These numbers differ from those in Eurostat table 'iww_go_atygo', as that table represents the amount of tonne kilometres within a country. This table presents the figures to a country and it is derived from Eurostat table 'iww_go_atygoff'.



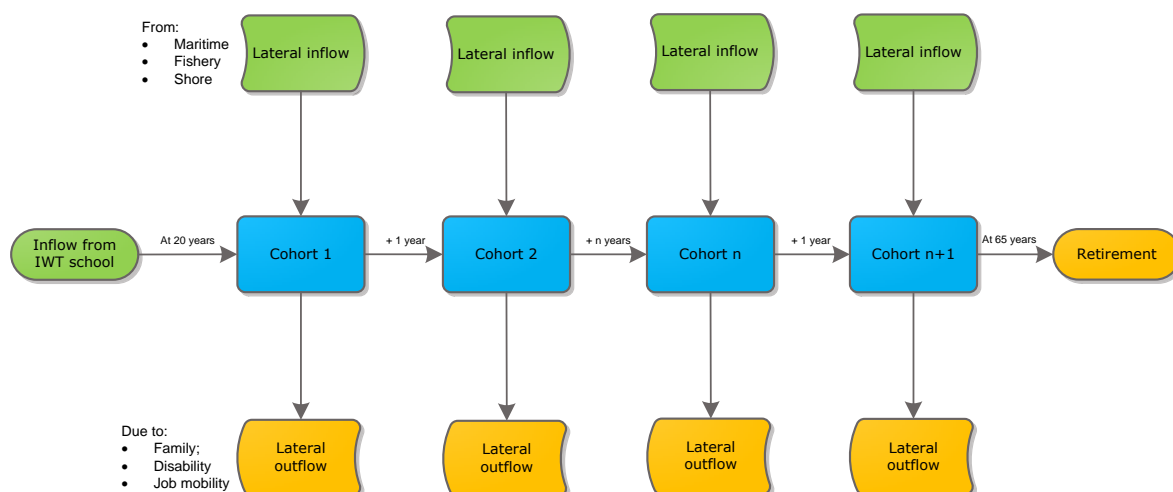
Appendix 4 Labour demand/supply model

The supply side of IWT workers is modelled according to the scheme that is shown in Figure 0.1. The core of the model consists of a subdivision of the workforce in different age cohorts. Over a certain time span, the various age cohorts either increase or decrease, because of:

- Inflow from younger workers from a lower age cohort
- Outflow of workers to a higher age cohort
- Lateral inflow of workers in an age cohort from other sectors (fishery, maritime, shore)
- Lateral outflow of workers in an age cohort (family circumstances, disability, job mobility)

As special cases, the lowest age cohort also has inflow from IWT training institutes (demonstrating the attractiveness of the IWT sector), while the highest age cohort has an outflow due to retirement.

Figure 0.1 Schematic overview of evolution of age structure of IWT workforce



The following assumptions are made in order to estimate the supply of workers:

- All persons that enrol in a IWT-training institute will have an IWT job, either by graduating (85%) or by a pathway via gaining experience in practice (15%);

Table 0.1 Statistics on the amount of students enrolled and graduating

Institute	Time ¹⁸⁷	Year	Students enrolled	Students graduating	Percentage graduating ¹⁸⁸
STC (NL)	2	2006	185	184	99,5%
		2007	177	172	97,2%
		2008	169	172	101,8%
		2009	180	178	98,9%
	4	2006	135	121	89,6%
		2007	124	126	101,6%

¹⁸⁷ Duration of Education Program (2 years for boatsmen, 3 years for helmsman and 4 years for captain)

¹⁸⁸ This number can be above 100%, when students double a year.



Institute	Time ¹⁸⁷	Year	Students enrolled	Students graduating	Percentage graduating ¹⁸⁸
Harlingen (NL)	2	2005	57	48	84,2%
		2006	70	55	78,6%
		2007	52	35	67,3%
		2008	61	61	100,0%
		2009	40	43	107,5%
Duisburg Schullschiff (DE)	3	2005	108	101	93,5%
		2006	94	87	92,6%
		2007	98	91	92,9%
		2008	119	99	83,2%
Duisburg SBK (DE)	3	2005	116	83	71,6%
		2006	106	91	85,8%
		2007	123	99	80,5%
		2008	144	134	93,1%
Total	N/a	N/a	2158	1980	91,8%

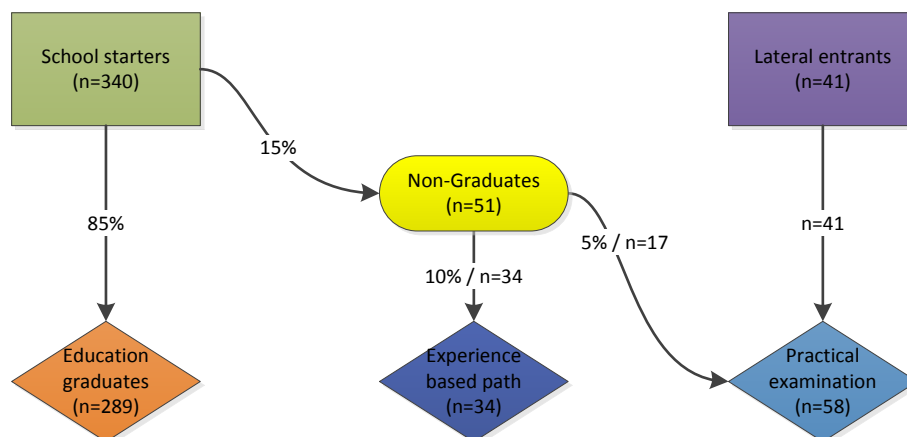
Source: Data collected by STC (2013)

- If applicable, out of the 15%, 2/3rd take the experience based path to obtain their qualifications and 1/3rd will take a practical examination.
- All people entering the IWT workforce via education, enter at the age of 20.
- Outflow (apart from retiring at the age of 65) and lateral inflow from other sectors balance each other for all age categories, as currently no data is available concerning lateral entrants or people leaving the sector before retiring¹⁸⁹.

Onderwijs Centrum Binnenvaart (2014) has reported 58 practical exams in 2013. We have assumed that 17 (=1/3rd of 15% of 340) of them are early school leavers that obtain their professional qualifications by practical examination. The latter (41 workers) is considered lateral inflow. Nederland Maritiem Land (2012) also reported an outflow of 130 workers in 2012, of which 32% is considered as lateral outflow. This equals 41 workers.

Thus, see figure 0.2 for an overview of entrants to the IWT sector

Figure 0.2 Schematic overview of entrants and paths to qualifications



¹⁸⁹ Apart from the fact that in the base case, lateral entrants are not taken into account due to the absence of reliable data, it must be noted that lateral inflow/outflow may help to level a labour market imbalance between demand and supply.



- Attractiveness of IWT-education remains constant over the years, meaning that a constant proportion of 20-year olds choose to enrol in an IWT training institute per year.
- The age of retirement for all workers has been set at 65 years.
- The distribution of IWT workers over the corridors remains proportionate.

In this study, the supply of workers is therefore determined by the current amount of workers plus the amount of new students entering in training institutes, minus the amount of retirements per year.



Appendix 5 Estimated number of workers in 2011

Countries	Total freight	Total passenger	Total IWT employment	Total boatmasters	Total operational staff
Netherlands*	10,820	3,088	13,908	6,053	7,855
Germany*****	2,774	2,815	5,589	1,337	4,252
France*	1,673	2,027	3,700	790	2,910
Luxembourg**	2,555	256	2,811	668	2,143
Italy*	634	1,919	2,553	1,290	1,263
Belgium*	1,851	548	2,399	1,659	740
Romania*	2,081	248	2,329	491	1,838
Bulgaria*/***	1,385	294	1,679	911	768
Switzerland	417	1,197	1,614	416	1,198
Sweden*	118	983	1,101	250	851
United Kingdom*	299	752	1,051	263	788
Hungary*	267	600	867	201	666
Portugal**	0	853	853	55	798
Czech Republic*	517	283	800	135	665
Poland*	313	303	616	284	332
Slovakia*	413	31	444	89	355
Spain*	44	344	388	62	326
Finland*	39	228	267	41	226
Austria*	51	157	208	88	120
Lithuania*	0	145	145	11	134
Denmark*/**	48	95	143	24	119
Croatia*/**	121	12	133	20	113
Latvia*	89	17	106	5	101
Estonia**	0	61	61	7	54
Slovenia*	40	21	61	38	23
Total	26,549	17,277	43,826	15,190	28,636
<p>* Based on division between mobile workers and self-employed given by EUROSTAT for 2010</p> <p>** Based on number of enterprises in 2010 (or most recent information) and the average number of self-employed and average number of workers per enterprise.</p> <p>*** Based on survey carried out in 2013 under Ministries, Trade unions and Employer organisations in EU-28.</p> <p>**** Based on share freight and passenger vessel within the IVR ship registration for the 2011.</p> <p>***** Based on available statistics for 2011.</p>					

Source: Ecorys (2013), updated by Panteia.

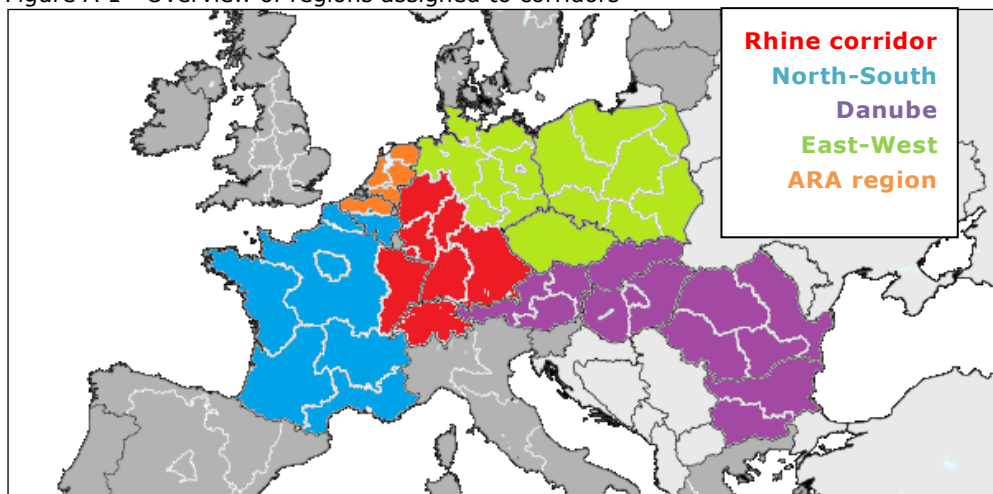


Appendix 6 Distribution of vessels over corridors

The distribution of vessels on operating areas has been obtained by analysing the following Eurostat table: "[iww go anavefl](#)". For this analysis, the year 2012 has been used and the regional scope has been limited to NUTS 1-regions. A large set of criteria has been used, in order to make the data suitable to obtain a distribution rate.

1. A selection has been made; only ships loading **and** unloading in the following countries have been analysed:
 - Austria;
 - Belgium;
 - Bulgaria;
 - Switzerland;
 - Czech Republic;
 - Germany;
 - France;
 - Hungary;
 - The Netherlands;
 - Poland;
 - Romania;
 - Slovakia
2. Furthermore, only reports by the countries of origin or destination of the vessel are used. This prevented vessels entering the list more than twice. For instance, a ship loading in Belgium and unloading on the German Rhine will be reported in three countries: Belgium, the Netherlands (on transit) and Germany. This way, all reports for ships on transit are left out of the analysis. A correction factor of 0.5 has been used for international traffic, in order to correct for the double reporting of international traffic in the country of origin and the country of destination.
3. All regions have been assigned to a corridor. See Figure A 1 for the overview of regions.

Figure A 1 Overview of regions assigned to corridors



4. Traffic (in tonnes) will be assigned to corridors. The following rules apply here:
 - a. Traffic from one corridor to another corridor will be equally divided among the corridors, i.e. a ship sailing from Paris (North-South) to Berlin (East-West) will be accounted 50% on the North-South corridor and 50% on the East-West corridor.
 - b. Traffic from the ARA-region to any of the corridors has been assigned for 100% to that certain corridor, i.e. a ship sailing from Rotterdam to the Danube will be completely assigned to the Danube region.
 - c. Intra corridor traffic will be assigned completely to the corridor, i.e. a ship sailing from Constanta (Danube) to Vienna (Danube) will be accounted for 100% to the Danube corridor.
 - d. Traffic within the ARA-region will be assigned to the ARA corridor.
 - e. Traffic within the North-South corridor with both the origin and destination in France are assigned to 'Domestic France', which is a subset of the North-South corridor.
5. For each nationality of vessels, the amount of cargo transported on each of the corridors is summed up.
6. On the Rhine and Danube corridor, operations take place with larger vessels. It is assumed that vessels with an average payload of 1,500 tonnes operate on the Rhine and Danube corridor. On contrary, vessels with a payload of 1,000 tonnes are operated on the North-South and East-West corridors.

Table 1 Allocation of workers over corridors

	<i>Rhine</i>	<i>North-South international</i>	<i>Danube</i>	<i>East-West</i>	<i>ARA traffic</i>	<i>North-South domestic FR</i>
Austria	1,8%	0,0%	97,9%	0,0%	0,3%	0,0%
Belgium	26,2%	36,7%	0,2%	0,9%	31,3%	4,7%
Bulgaria	2,6%	0,2%	95,7%	1,5%	0,0%	0,0%
Switzerland	65,2%	2,9%	0,0%	1,2%	30,7%	0,0%
Czech Republic	7,0%	2,9%	0,2%	83,0%	1,6%	5,4%
Germany	51,1%	1,1%	2,8%	39,0%	5,9%	0,2%
France	2,3%	14,5%	0,1%	0,1%	2,6%	80,3%
Hungary	11,8%	0,1%	85,8%	0,3%	2,1%	0,0%
Netherlands	55,9%	6,6%	0,3%	2,7%	34,2%	0,3%
Poland	5,4%	2,2%	0,0%	90,1%	2,3%	0,0%
Romania	0,9%	0,0%	99,0%	0,0%	0,1%	0,0%
Slovakia	10,6%	0,3%	86,9%	1,0%	0,9%	0,3%

Source: Panteia (2014)



