Study on the EU harmonisation of the requirements for the road circulation of mobile machinery – FWC ENTR/172/PP/2012/FC/Lot1

Final Report

Client: EASME

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Executive Summary

Why harmonise the road circulation requirements in the EU?

Over the years, various initiatives[1] have been undertaken to harmonise the requirements affecting machines of all types being produced, sold and used in the EU. Despite these substantive efforts mobile machines[2] are still facing a series of different requirements across EU Member States when requesting road approval causing costs for manufacturers, authorities, users and citizens. Main buyers of this equipment come from the construction and the agriculture industries, as well as municipalities.

The aim of this study is to provide input for the EU Impact Assessment (IA) accompanying a new legislative proposal to overcome these issues. More precisely the study substantiates the problem analysis and assesses it in a qualitative and quantitative manner and compares costs and benefits of possible solutions (policy options).

A comprehensive research effort

To address the objectives of the study, first the sector was defined on the basis of Eurostat PRODCOM codes (including expert judgement from sector representatives). Then a technical investigation was conducted based on desk research, interviews and legislative review, outlining the key requirements causing difficulties for the industry and the areas of strongest divergence between Member States. The problem and its impacts were then quantified and compared based on the Standard Cost Model (SCM) and a sector survey with 29 manufacturers capturing almost 70% of the EU market.

A diverse segment of the industry: € 10.3 bn production value of which € 6.7 bn fit for use in the EU

The mobile machinery industry cannot be statistically defined as a 'sector', but consists of a series of products across sectors (such as agricultural machinery (excl. tractors), construction machinery, garden equipment, municipal equipment). Main products (in terms of value in 2013) are combine harvesters-treshers (16.9% of EU production value), dumpers for off-highway use (14.8%) and machinery for public works (13.1%). The total production value in the EU amounts to €10.3bn concentrated mainly in a small number of Member States. Germany (44.8%) is the main producers followed by Italy (13.8%), the United Kingdom (13.2%) and France (10.2%).

The sector is also a strong exporter selling 45% (€4.6bn) outside the EU. At the same time about € 1 bn of machinery is imported into the EU. Consequently mobile machinery of a value of € 6.7 bn needs to be made fit for use in the EU (and is therefore affected by non-harmonised legislation). Market trends showed a peak in terms of market size just before the outbreak of the economic crisis which hit the sector hard in 2009. The agricultural[3] machinery segment is slowly recovering, but still not expected to reach pre-crisis levels before 2025. The construction[4] machinery segment recovered after 2009, but is expected to remain rather stable considerably below the crisis peak level.

[1] Amongst others: NRMM Directive 97/68/EC, Outdoor Noise Equipment Directive 2000/14/EC, Machinery Directive 2006/42/EC, Regulation (EU) No 167/2013

[2] Mobile machinery refers to any self-propelled mobile machine or vehicle, with a maximum design speed higher than 6 km/h, running on tyres and that is not intended for carrying passengers or goods on public roads

[3] Including gardening and forestry machinery

[4] Including municipal equipment

The problem: a highly complex interplay between administrative burdens, time delays, barriers to innovation, access to markets and product prices

The overall problem of having non-harmonised requirements for the road circulation of mobile machinery in the EU consists of three specific problems:

- *Road approval procedure costs* cause direct (administrative burdens for manufacturers and regulatory charges) and indirect costs to industry (time delays in the introduction of new products, reduced product innovation etc.) as well as indirect costs to others (administrative costs for MS governments, administrative burdens for dealers, time delay in delivery etc.);
- *Compliance costs related to non-harmonised requirements* are causing direct industry costs (additional logistics, administrative translation, additional manufacturing & design costs) which cause indirect industry costs (higher product prices, barriers to market entry etc.). Based on the market power of the industry such costs may be further passed-on to downstream clients (in the form of increased prices or different prices across Member States, differentiated access to machines);
- *Substandard road safety requirements* can be caused in some Member States due to no EU obligation of minimum requirements which might cause an increased number of road accidents involving mobile machinery.

Germany, Italy and France can be considered not only the main producers of mobile machinery but also the most demanding Member States in terms of road circulation requirements. Other Member States still have comparatively lower requirements. Industry expects them however to raise their requirements substantially within the next decade. Assessing the types of requirements shows that vehicle performance and control as well as vehicle dimensions are the main categories generating difficulties for industry. Particularly diverging and rigid braking requirements are seen as an issue.

Impacts: a mix of direct and indirect costs for both industry and other stakeholders

Costs caused by non-harmonisation consist of both direct and indirect costs. Both categories can be further split between industry and other stakeholder costs. Such costs are not always evident (which is particularly the case for indirect costs). Therefore the main quantification is based on direct costs for industry (based on SCM).

Direct costs: € 90 m. per year or 1.3% of industry turnover

Direct costs for the industry to comply with existing legislation add up to €90 m in the EU. This corresponds to 1.3% of their turnover[5]. The costs occur across seven key compliance activities:

1) Staff familiarisation with the legislation;
2) Type approval body testing / third-party testing;
3) Product design / development costs;
4) Internal company product testing;
5) Administration;
6) Manufacturing of safety features;
7) Product markings and other information.

The highest amount of money is spent on type approval and third-party testing (86% of total costs and 29% of staff costs[6]). All other activities are mainly staff intensive. The highest staff costs occur in: internal testing (17% of staff costs), product design (15% of staff costs).

[5] It needs to be noted that not all such costs would disappear if harmonization was achieved. Even in the case of complete absence of any kind of legislation, industry would still invest in safety to fulfil the needs of their clients

[6] Costs can be further distinguished between staff and direct costs. Staff costs are costs occurring through the payment of a salary to staff. Direct costs are for example costs to get a certain document approved or to by tools etc.

The importance of direct costs due to non-harmonisation increases with the number of markets served and is therefore becoming increasingly visible for large manufacturers aiming at serving the whole EU.

Substantial barriers to enter broader EU markets – especially so for SMEs

Indirect industry costs such as barriers to market entry are impacting above all SMEs who consider it more than other firms too challenging to enter new Member States markets and to comply with their specific rules. Indeed, SMEs surveyed are present in less EU markets than large companies. Although there are many factors at play when deciding to enter or abandon particular national markets, the prospect of having to deal with the costs for road approval is certainly one element. This also creates a differentiated offer of machines to downstream clients who may face an unfair competitive level playing field across the EU.

Costs are expected to increase over time – as safety concerns put pressures on national requirements

Furthermore, the problem is not of a static nature. Without EU intervention, industry expects the costs to further increase in the next decade due to increased national requirements, especially so in the New Member States (direct costs: +33%; indirect costs: +20%). Consequently, the market will further fragment, which could lead to a further reduction of the offer for downstream clients (mostly construction and agriculture sectors).

The policy response: four options

Harmonisation of the requirements for the road circulation of mobile machinery would not only reduce costs to manufacturers, authorities, clients and other related stakeholders and create a level-playing field for all, but also provide a consistent high level of safety on the road for mobile machinery across the EU. EU intervention therefore needs to define policy options which achieve:

- a decrease of roading approval and certification costs for industry;
- a decrease of compliance costs related to non-harmonised requirements;
- guarantee high standard road safety requirements across the EU.

Based on these objectives the following four policy options (including a series of sub-options) were defined:

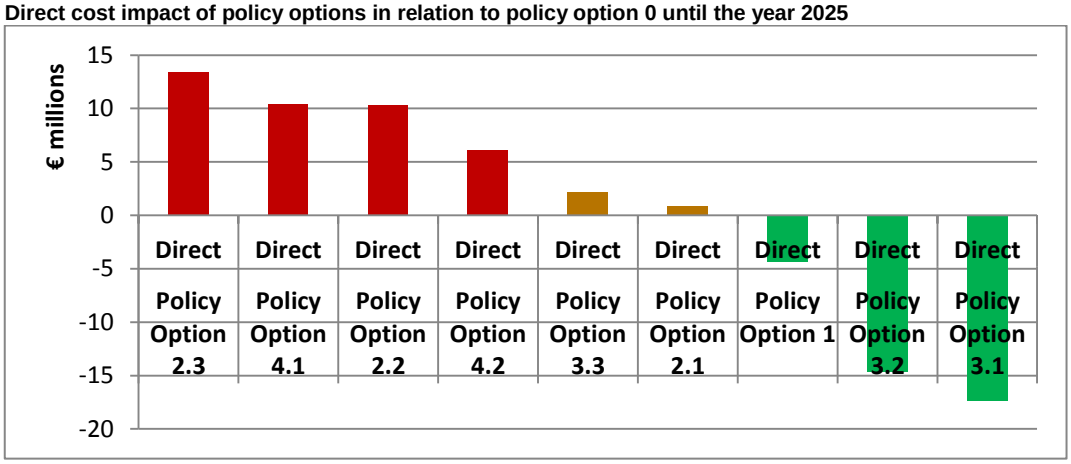
Table 1 **Possible policy options to address the problem of non-harmonisation**

Policy option	Description	Sub-option
Policy option 0	Do nothing	-
Policy option 1	Mutual recognition	-
Policy option 2	Harmonised legislation for systems/components/separate technical units for mobile machinery related to road circulation	Self-certification
		Part self-certification and part third party certification for safety critical components (the safety critical components need to be defined in the options)
		Complete third party certification
Policy option 3	Harmonised legislation for the whole approval of self-propelled and towed mobile machinery (including all separate technical units) related to road circulation'.	Self-certification
		Part self-certification and part third party certification for safety critical components (the safety critical components need to be defined in the options)
		Complete third party certification
Policy option 4	EU type approval	EU separate system and component type approval
		EU whole vehicle type approval

Harmonised legislation has clearest benefits

Based on the survey results, all policy options under observation need to be compared with policy option 0 ('do nothing') to assess their relative advantages or disadvantages. The most beneficial policy options are options 3 and 4. Policy option 2 (even though a step in the right direction) is not sufficient to solve the problem and policy option 1 is not seen as feasible to address the issue at stake. Comparing the policy options in terms of direct costs (only), shows that policy option 3 (and in particular 3.1 and 3.2) is the most beneficial policy option[7].

Table 2 **Direct cost impact of policy options in relation to policy option 0 until the year 2025**



Source: Ecorys SCM calculations based on Sector Survey

Additional expert view: EU type approval could work as well

Although survey responses point to a clear preference for option 3, expert views suggest that EU type approval (particularly option 4.2) could also provide benefits in terms of effectiveness, efficiency and coherence – as any increases in future costs can be stopped. However, this option appears not to be favoured by industry representatives as it is not compatible with self-certification.

Stakeholders affected differ by option

In principle, all policy options affect: manufacturers and dealers, downstream clients, citizens at large, Member State authorities and third-party testing bodies. There are however some differences between policy options:

- Policy option 1 mainly impacts large manufacturers and Member State authorities;
- Policy option 2 positively impacts primarily downstream clients;
- Policy option 3 has stronger positive impacts than policy option 2 on all stakeholders affected;
- Policy option 4 has similar positive impacts as policy option 3, but is not favoured by (at least large) manufacturers as it does not contain any aspect of self-certification which would be seen as a key to reduce direct costs.

Conclusion: a need to make the Single Market work

The non-harmonisation of requirements for road approval of mobile machinery causes considerable differences across EU Member States and therefore harms the correct functioning of the Single Market. It leads to barriers to EU markets particularly for SMEs. It also leads to increased costs for industry. Depending on the market situation, these costs may be passed on or not towards downstream clients. This also prevents a level playing field for downstream clients who do not have access to the same products and at same prices across the EU. Furthermore, it can lead to costs for other stakeholders involved (e.g. Member State authorities, dealers).

[7] Also policy option 1 shows positive cost impacts, but this is based on the hypothetical scenario that 'it worked'. This is however strongly questioned by industry and experts.

To address the above problems, the most beneficial policy options are option 3.2 proposing a harmonised legislation for the whole approval (making use partially of self-certification and third party certification for safety critical components) and policy option 4.2 proposing an EU whole vehicle type approval). While the former represents in our view the highest cost savings for industry in the short term, the latter reaches a similar goal for the whole sector in the longer term.

1 Introduction

1.1 Background

Mobile machinery is indispensable for the proper functioning of the agricultural, construction, municipal equipment, lifting/handling, gardening and forestry sectors. Various initiatives at an EU level have been undertaken to harmonise the requirements of the sector. These include (non-exhaustive list):

- the Non-Road Mobile Machinery (NRMM) Directive 97/68/EC;
- the Outdoor Noise Equipment Directive 2000/14/EC;
- the revised Machinery Directive 2006/42/EC;
- the Regulation (EU) No 167/2013 on the approval and market surveillance of agricultural and forestry vehicles.

As a consequence of these EU efforts and initiatives, at least parts of the sector and its products have harmonised requirements today. However, disparate technical requirements, including third-party certification, remain at national level and create an additional burden on the industry. The lack of harmonisation entails additional costs for various actors along the value chain. These costs primarily impact manufacturers (small and medium-sized as well as larger companies), where non-harmonisation causes difficulties in innovation, longer periods for the development of marketable products and necessary variants which comply with quite different provisions of Member States and delays in the introduction of new products within the EU, because of multiple third-party testing and certification.[8] However, these costs may also have a bearing on the proper functioning of the agricultural, construction, municipal equipment, lifting/handling, gardening and forestry sectors for which this machinery is produced.

Since the publication of the Ifo (2001) study, which already assessed the costs of non-harmonisation, the number of Member States has almost doubled (from 15 to 28 Member States) and EU regulation and national regulations have evolved. In several Member States, national regulations have been tightened since and the divergence between Member States appears to have grown over time. In essence, the issue at stake remains the same - non-harmonisation causes costs. However, the scale of the problem appears to have increased since and it risks to further increase in the future. Therefore, a new and updated assessment of the state-of-play with respect to non-harmonised requirements and their impacts is considered timely and necessary by the EC. In this context, the present study supports an Impact Assessment through outlining differences in requirements and quantification of (economic) impacts of various policy options.

1.2 Definition of the industry and markets

Mobile machinery refers to any self-propelled mobile machine or vehicle, with a maximum design speed higher than 6 km/h, running on tyres and that is not intended for carrying passengers or goods on public roads[9]. Such machinery can be used for a wide and diverse number of purposes, namely:

- Agricultural machinery, such as harvesters and threshing machines, including forestry equipment;

[8] Ifo (2001): Restrictions of the Free Circulation of Off-road Machinery in the EU
[9] Ibid.

- Construction machinery, including lifting and handling equipment, mobile cranes, industrial trucks etc;
- Garden equipment, including specific motor mowers;
- Municipal equipment, including equipment for street cleaning and snow removal.

Given existing legislation which harmonises already tractors, the scope of the study excludes tractors, trailers and interchangeable towed equipment (for agricultural and forestry vehicles).

Operationalising this definition into existing statistics does not go without further assumptions/delineations. The market size assessment in this report is based on the data collected and published by Eurostat according to the PRODCOM database (NACE Rev.2) where a series of product lines are defined and the production, import and export values and quantities are presented. Our approach is based on PRODCOM as it is the only database providing data at a level sufficiently disaggregated to distinguish the products that fall under the scope of this study from products not applicable to this analysis.

The mobile machinery segment is extremely diverse and consists of an array of several hundreds if not thousands of machine types. For the purpose of this analysis, the segment has been defined as the combination of a number of codes that to a great extent correspond to the mobile machinery that fall under the scope of this assignment. The PRODCOM product codes that have been selected as relevant for this analysis are considered to contain the vast majority of relevant products. Nevertheless, some of the eligible mobile machinery products might be part of product categories that also contain non-eligible products and are not included in this selection. Whilst also some non-eligible products might be contained in this code selection, the volume of these products is considered to be minimal compared to the selection as a whole. This selection of codes has been verified in a workshop meeting with industry representatives. During this meeting, the portion of the content of each code that is eligible for this study has been estimated and agreed upon. The selected PRODCOM codes are presented in Table 1.1.

Table 1.1 Selected PRODCOM codes

PRODCOM code	Description	Eligibility %
	Selected - ALL in scope	
28221850	Loading machinery specially designed for agricultural use	100 %
28303900	Agricultural... forestry machinery, n.e.c[10].; lawn or sports-ground rollers	100 %
28305915	Combine harvester-threshers	100 %
28305930	Agricultural threshing machinery (excluding combine harvester-threshers)	100 %
28305975*	Grape harvesters	100 %
28305990*	Harvesting machines (excluding combine harvester threshers, root or tuber harvesting machines, forage harvesters)	100 %
28305970*[11]	Harvesting machines (excluding combine harvester threshers, root or tuber harvesting machines, forage harvesters)	100 %
28308630	Forestry machinery	100 %
28922150	Wheeled dozers (excluding track-laying)	100 %
28923090	Machinery for public works, building..., having individual functions	100 %

[10] Not elsewhere classified
[11] The collection of data for PRODCOM codes 28305975 and 28305990 has been merged into code 28305970 from 2008 onwards.

PRODCOM code	Description	Eligibility %
28221570	Works trucks, self-propelled, not fitted with lifting or handling equipment, of the type used in factories, warehouses, dock areas or airports	100 %
	Partly in scope	
29105990	Other special-purpose motor vehicles n.e.c.	10 %
28304030	Mowers for lawns, parks or sports grounds, powered non-electrically, with the cutting device rotating in a horizontal plane	50 %
28304050	Motor mowers for lawns, parks or sports grounds, powered non-electrically, with the cutting device rotating in a vertical plane or with cutter bars	50 %
28305420	Potato-diggers and potato harvesters	50 %
28305450	Beet-topping machines and beet harvesters	50 %
28305480	Root or tuber harvesting machines (excluding potato-diggers and potato harvesters, beet-topping machines and beet harvesters)	50 %
28305960	Forage harvesters, self-propelled	50 %
28221530	Self-propelled trucks fitted with lifting or handling equipment, non-powered by an electric motor	20 %
28922900	Dumpers for off-highway use	90 %
28922730	Self-propelled bulldozers, excavators..., n.e.c.	10 %
28922750	Self-propelled earth moving, excavating... machinery, n.e.c.	30 %
28922200	Motor graders and levellers	20 %
28922300	Motor scrapers	20 %
28922400	Ride-on compaction equipment and the like	20 %
28922550	Wheeled loaders, crawler shovel loaders, front-end loaders	20 %
29105950	Concrete-mixer lorries	10 %

Source: Ecorys based on PRODCOM and judgement of sector experts during the workshop

The final delineation of the segment is hence much stricter than in previous assignments (see Ifo 2001)[12].

1.3 Aim of this study

The aim of this study is to provide input for the Impact Assessment (IA) accompanying a new EU legislative proposal for the harmonisation of the health and safety requirements of road circulation of self-propelled mobile machinery and towed machinery. The study thus aims at measuring the possible economic, social and environmental impacts of a new harmonised regulatory system.

More precisely, the study will substantiate the problem and assess it in a qualitative and quantitative manner, quantify the impacts of possible solutions (policy options) and compare their costs and benefits.

[12] Consequently when comparing estimates only the ratios between costs and market size can be compared, but not absolute figures.

1.4 Approach of the study

The **size of the EU market for mobile machinery** has been estimated through data from the PRODCOM database. Estimates refer to production, export and import value and units of mobile machinery and the market share of each product code. Additionally, the values of the most significant Member State markets have been estimated using the Apparent Consumption indicator. Based on a short-term industry outlook[13] and the workshop with industry representatives, a 10-year forecast is presented for two distinct market segments: agriculture[14] and construction[15] machinery. Annex I provides an overview of the methodology for the quantification of the sector.

Information on **technical requirements** has been collected through desk research (on eight Member States)[16], exchange with industry associations, a company survey and through the approaching of 123[17] national regulatory bodies across the EU. The technical fiches were then verified by NRMM experts in order to assess the factual accuracy of the provided information.

The **examination of the costs of compliance with national legislation** has been performed on the basis of the Standard Cost Model. Our approach has been based on independent research combined with regular exchange of views with five EU level associations[18], and input from other stakeholders (five pilot interviews with manufacturers) and inputs from related associations[19]. Scoping interviews have thereto been conducted with industry associations and additional interviews or exchange throughout the project.

A **draft survey** for collecting data for the Standard Cost Modelling (SCM) has been prepared and reviewed in a workshop with the European Commission and industry associations on 24th June 2015. During this workshop, limitations and risks of the work, definitions of the industry as well as policy options outlined in the Terms of Reference to this study were elaborated. A draft survey was submitted to the client in June 2015 for approval. On the basis of minor amendments, a final version was accepted.

After having collected feedback on the survey (including the policy options to be tested) by phone and in written form from industry as well as the European Commission the project team visited relevant companies in different Member States to conduct five **pilot interviews** during the summer period 2015. The purpose of the pilot interviews was twofold:

- Test the survey, collect first data and improve the phrasing of questions;
- Improve our understanding of the problem and collect specific examples qualitatively substantiating the argumentation.

Pilot interviews revealed that there are limits to the extent that manufacturers will be able to provide some data to the level of detail demand by the SCM reporting sheet, and that indirect costs will be difficult to quantify.

The AMADEUS data base was used as a basis for company listing. Contacts were established either through associations or by direct contacting (more than 100 companies were approached). Care was taken that SMEs would be well represented in the sample and that EU-wide geographic

[13] http://www.agrievolution.com/PDF/2014-Agrievolution-Tractor-Market-Report.pdf
http://www.cece.eu/fileadmin/user_upload/documents/Communication/Publications/CECE_annual_economic_report_March_2015.pdf
[14] Including agriculture forestry and gardening machinery
[15] Including construction, municipal and lifting machinery
[16] Member States responsive or assessed through desk research: AT, DE, ES, FR, GR, IT, PL, SE
[17] The response rate amongst national regulatory bodies was around 10 %
[18] CECE, CEMA, EGMF, FEM, and EUnited Municipal Equipment
[19] Rural contractors, ATVEA

coverage be respected as well. Cooperation of companies not being approached through associations was very limited (see Annex III.3 for an overview of the sample).

The written surveys have been **telephone-assisted**. Typically, a first 'introductory phone-call' was placed to explain the purpose of the study and the questionnaire followed by a 'research period' wherein the company could collect necessary data. The survey was concluded by a second 'closing call' where open questions, misunderstandings and further elaborations were discussed.

Following the survey, we have **assessed the quality of the data**, and have taken the necessary measures including telephone follow-up to check for any outliers and/or anomalies. A total of 29 completed surveys have been used for quantification purposes. Further exchange with companies and associations has been used for qualitative assessments.

On the basis of the information provided, an **analysis of results** including an estimate of expected economic, social and environmental impacts of the proposed policy options has been made. The analysis includes a quantification of the problem, estimations on the impacts of the policy options outlined in this report and a comparison of policy options. The quantitative focus lies on direct cost for manufacturers. Information on hassle costs and indirect costs was also collected during the survey. Given the diverse interpretation of such costs, which implies the comparison with a hypothetical counterfactual scenario, individual company answers differ to such an extent that reliable aggregated estimates cannot be provided. Hence these costs are assessed rather in a qualitative form where the robustness of the numbers would be at stake.

1.5 Structure of the report

The remainder of this report is structured as follows:

Chapter 2 provides an overview of the relevance and the importance of the EU industry and markets, in terms of market value and trends, production value, exports and imports as well as the estimated internal EU market size – now and its future perspective.

Chapter 3 provides a detailed analysis of the problem – the non-harmonised requirements for the road circulation of mobile machinery in the EU. The problem is elaborated from the perspective of industry costs as well as the Single Market perspective. It includes quantitative (for direct costs) and qualitative (direct and indirect costs) information. Moreover at the end of this chapter a baseline scenario is developed assuming no-EU policy action.

Chapter 4 describes the objectives and policy options of possible policy initiatives. It includes an elaboration of the (sub-) options as they have been developed by the European Commission, jointly with industry stakeholders and the contractor's team.

Chapter 5 presents an overview of the impacts of these options in terms of economic, social and environmental terms.

Finally, **Chapter 6** concludes on costs and benefits, stakeholders affected and impacts on competitiveness as well as future monitoring of the situation.

2 Industry and market assessment

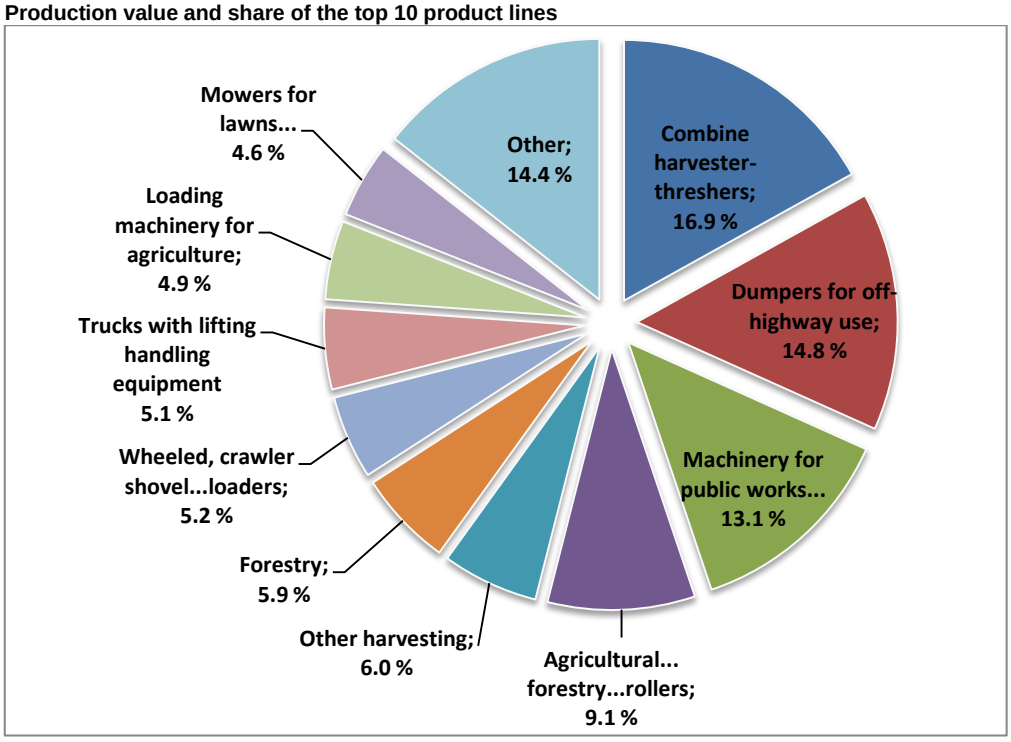
Building on the statistical delineation of the sector under observation (see chapter 1.2 and annex I), this chapter assesses the size of the industry in the EU. First, the EU production is quantified, followed by an assessment of exports and imports. Making use of the findings on production value and exports and imports, the EU market size of machines produced in the EU is quantified – in other words the volume which needs to be homologated. The last part of the chapter provides an outlook for the development of the sector.

2.1 EU production value

Overall production value amounting to € 10.3 bn

According to 2013 figures, the overall EU production value for the product lines covered amounted to € 10.3 bn. The top 10 of most significant mobile machinery product lines, in terms of production value combined, account for € 9.1 bn. Their respective production value and market shares are presented in Figure 2.1.

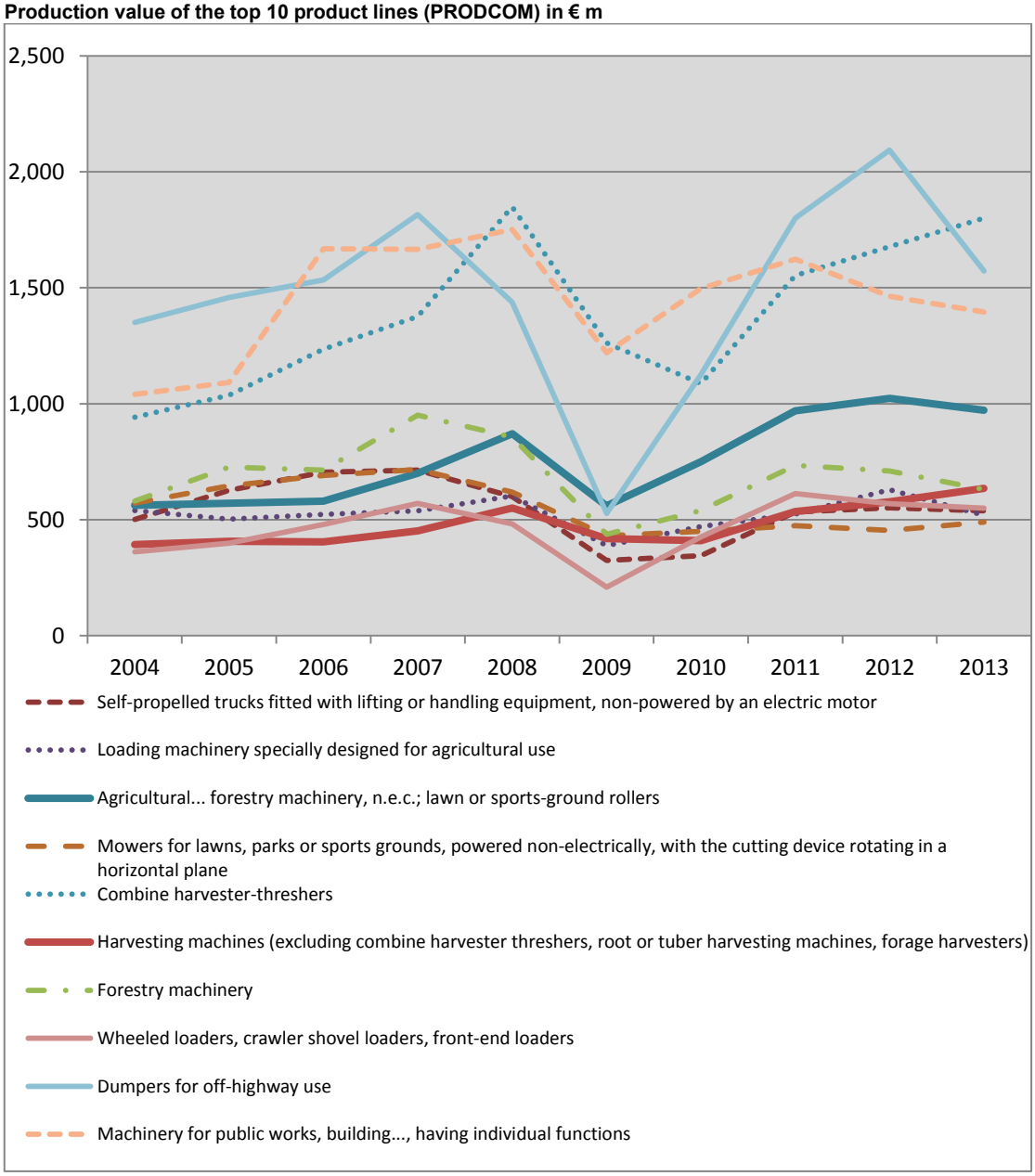
Figure 2.1 **Production value and share of the top 10 product lines**



Source: Ecorys based on Eurostat PRODCOM

When looking back over the last 10 years, all product lines appear to follow similar patterns, coinciding with the overall economic cycles. Following an initial production expansion in the 2004-2007 period, the sector experienced a steep dip in production volumes after the outbreak of the 2008 crisis, just to bounce back after 2009 and somehow stabilise in the 2011-2013 period. Taken together, production values are now reaching pre-crisis levels, although clear performance differences existing between product lines.

Figure 2.2 **Production value of the top 10 product lines (PRODCOM) in € m**



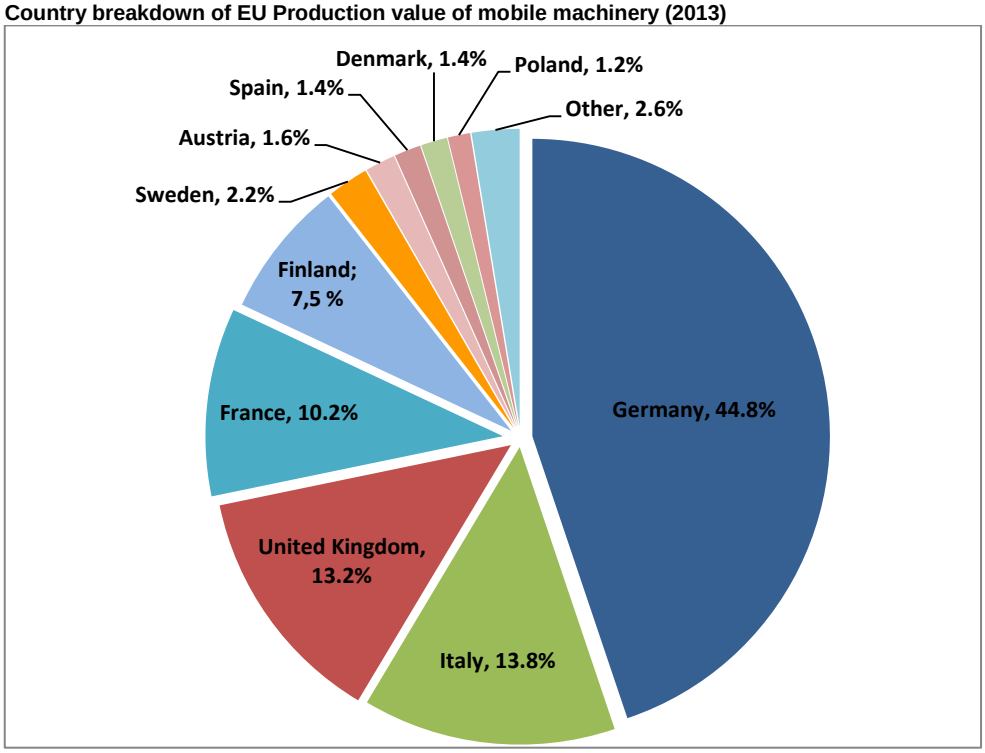
Source: Ecorys based on Eurostat PRODCOM

EU production of mobile machinery is highly concentrated

Out of these top 10 product lines (worth € 9.1 bn), four of these are relevant for the construction sector, including also machinery for municipal use or for lifting and handling while. The other 6 production lines are relevant to agriculture, gardening and/or forestry use. The distinction between these two broader categories is similar when regarding market volume. The agriculture/forestry product lines represent approx. 55 % (€ 5 bn) of the total production value of all mobile machinery produced in the EU, while 45% falls under the construction category (€ 5 bn).

Overall, the production of mobile machinery products in the EU is highly concentrated in a small number of Member States (MS): nearly 90 % is controlled by just five Member States. Nearly half of the EU production value is generated in Germany (45 %). Italy (13.8 %), the United Kingdom (13.2 %), France (10.2 %) and Finland (7.5 %) are other important producers. Austria, Spain, Sweden, Denmark and Poland supplement the list of countries contributing each with over 1 % of the EU production of mobile machinery.

Figure 2.3 Country breakdown of EU Production value of mobile machinery (2013)



Source: Ecorys based on Eurostat PRODCOM

2.1 Sector structure

The production of mobile machinery in the EU is spread between large and small manufacturers. Like in other segments of the machinery industry, a small number of large companies control large shares of the market. SMEs tend to be more specialised on niche markets. Given that mobile machinery is no independent sector in statistics, the assessment of the breakdown between SMEs and large companies needs to be based on that of the aggregated sectors.

An estimation of size distribution, based on the company listing of the AMADEUS database,[20] points to SMEs accounting for 96 % of all companies registered. Nevertheless, large enterprises contribute 82 % of the sector's revenues and 71 % of employment. SMEs thus account for 18 % of the sector's revenue, and are responsible for 29 % of the employment generated.

Method to assess sector structure

The assessment of the sector structure was made based on 2015 data from the AMADEUS database. The level of disaggregation of the database is 4-digit NACE Rev.2 codes. These aggregated codes contain also machinery of similar production nature and therefore the sector structure can be considered to be fairly similar to the mobile machinery segment under the scope of this analysis. The higher-level NACE codes selected for this analysis are:

- 2830: Manufacture of agricultural and forestry machinery
- 2892: Manufacture of machinery for mining, quarrying and construction

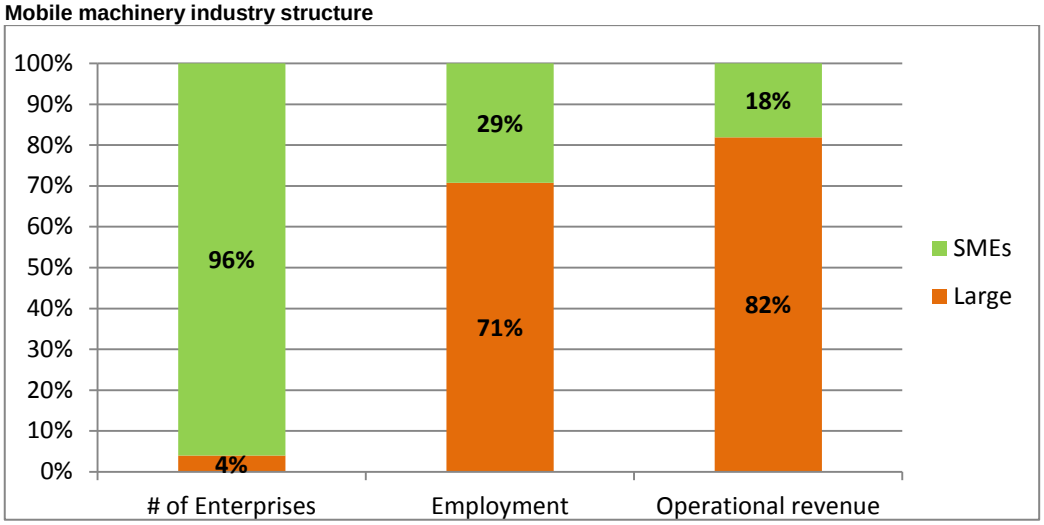
Sector production and employment dominated by large enterprises

Large companies constitute as little as 4% of the mobile machinery sector in terms of number of enterprises. Nonetheless, they are based on the approximation of NACE codes accountable for

[20] Enterprises classified with NACE Rev.2 codes 2830: Manufacture of agricultural and forestry machinery and 2892: Manufacture of machinery for mining, quarrying and construction

82% of the operational revenue and approximately 71% of the employment the sector generates with no significant difference observed between the agricultural and construction machinery sub-categories. As SMEs account for a proportionally larger generated employment compared to their revenue, their productivity can be considered substantially lower than that of larger companies.

Figure 2.4 **Mobile machinery industry structure**



Source: Ecorys based on AMADEUS

2.2 Exports and imports

Strong reliance of the sector on exports – both to EU and non-EU

The EU mobile machinery sector is a significant producer and exporter of mobile machinery globally. With an estimated export value of € 4.6 bn[21] (PRODCOM, 2013), nearly half of the production from EU Member States is exported to non-EU countries. Based on own calculations comparing extra-EU exports to the sum of MS exports, an additional € 4.5 bn is expected to be exported intra-EU. This implies that of the € 10.3 bn production value, only approx. 12 % is sold in the Member State where production takes place. Thus, mobile machinery producers are extremely reliant on road approval and homologation in other countries (both EU and non-EU).

At the same time, mobile machinery imports into the EU28 area are estimated to be a mere €1.0 bn. This import/export ratio points to a very strong competitive position of the EU mobile machinery industry within the EU market as well as globally.

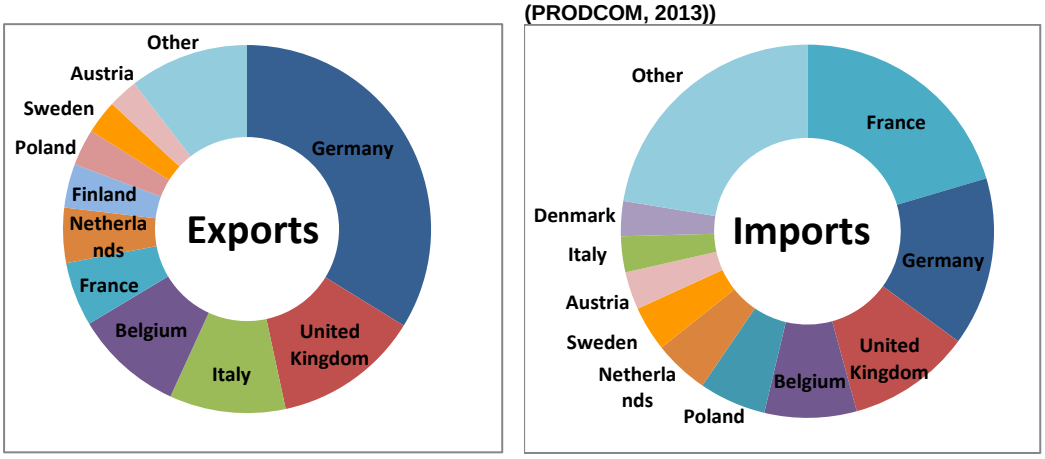
The most important traded product lines (2013) appear to be in construction equipment, notably the "Machinery for public works, building, having individual functions" and the "Dumpers for off-highway use". Taken together, the EU market for construction machinery appears to be more integrated in the global market with larger parts of production being traded. Anecdotal evidence supports this finding and confirms that imports from non-EU countries (e.g. Japan, US and increasingly China) are stronger in construction machinery. Agriculture machinery production appears to a large extent oriented towards serving the EU market.

A total of approximately 90 % of the mobile machinery exports[22] are attributed to 10 Member States. Germany exports about 34 % of all EU mobile machinery, corresponding to € 3.1 bn of

[21] EU aggregates reported by PRODCOM account only for extra-EU trade, whereas trade statistics for individual MS statistics include trade with countries inside and outside the EU.
[22] both intra-EU and extra EU exports

export value. The United Kingdom, Italy and Belgium[23] follow, holding a share of 12.8 %, 10.2 % and 9.6 % of the total EU market respectively. Within the EU, France and Germany are the countries with the highest imports of mobile machinery, with € 1.2 bn and € 0.8 bn of import value respectively. These are followed by the UK (€ 0.6 bn) and Belgium (€ 0.5 bn). Other significant importers of mobile machinery are Poland (€ 0.3 m), and the Netherlands (€ 0.3 bn).

Figure 2.5 **Top 10 exporting and importing Member States (accounting for both intra- and extra-EU trade (PRODCOM, 2013))**



Source: Ecorys based on Eurostat PRODCOM

2.3 Estimated internal EU Consumption - EU market size

The EU market size – around € 6.7 bn per year for the selected product lines

The internal EU consumption – reflecting the EU market demand – can be estimated by taking the EU production value, minus the part which is exported outside EU, and adding to this the imports of mobile machinery products from outside Europe. This is the current volume which needs to be homologated in the EU and hence undergo road approval procedures.

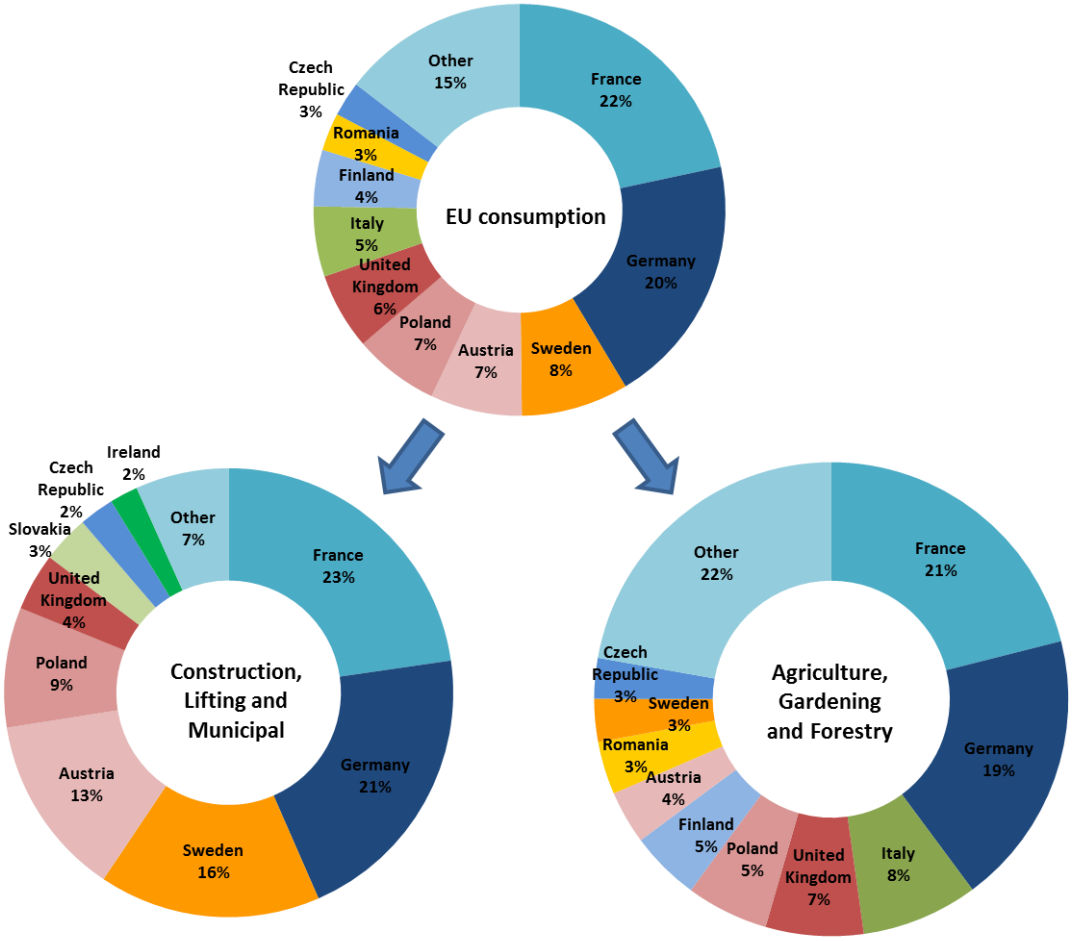
The total EU28 production value (for the sector as defined under chapter 1.2) is estimated to be € 10.3 bn in 2013, internal EU **'apparent'[24] consumption is around € 6.7 bn** (€ 10.3 bn production EU28 – € 4.6 bn exports + € 1.0 bn imports). A breakdown of this market by Member State for construction and agriculture/forestry machinery is provided by the following figure 2.6[25].

[23] Despite its low production value, Belgium appears high in the import and export statistics for mobile machinery probably due to its position as an important trade nation

[24] Apparent refers to the fact that these figures have been constructed on the basis of EU production value minus non-EU exports and adding imports from non-EU.

[25] The estimation of the apparent consumption for Member State tends to underestimate the shares of countries which have only a small number of large producers. This is due to the limitations of the PRODCOM database on availability of production data and the assumptions applied to overcome them (see methodology description in Annex I). This is probably the case for countries like Spain and Italy which seem to be underrepresented in figure 2-5.

Figure 2.6 Member State market shares for mobile machinery (2013)



Source: Ecorys based on Eurostat PRODCOM

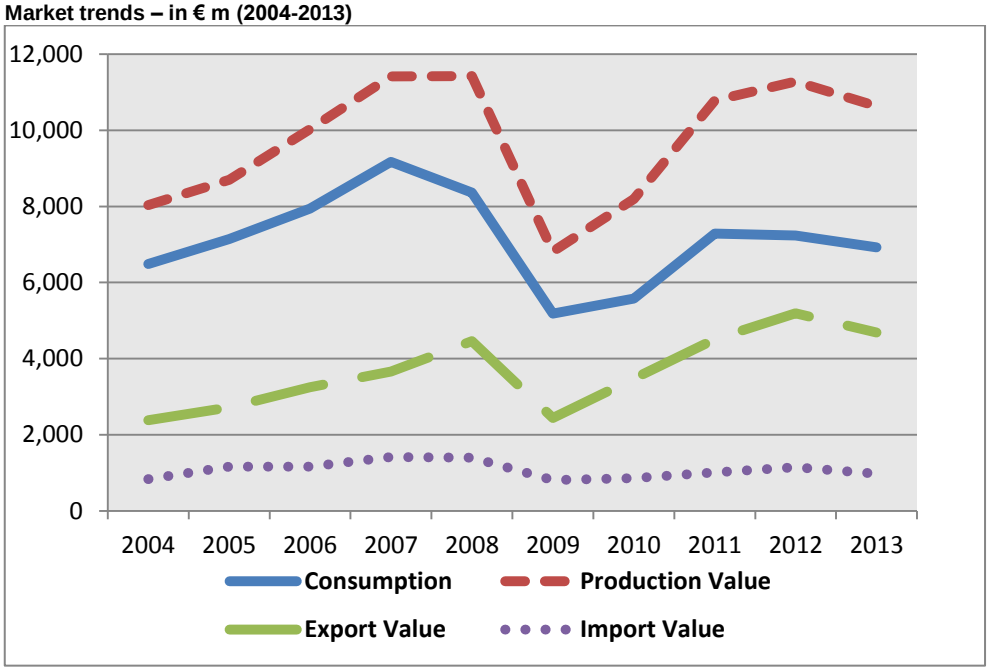
Taken together, France and Germany are by far the largest markets for mobile machinery, about 24 % and 20 % of the EU market respectively. Sweden, Austria and Poland follow at a substantial distance with market shares just over 5 %. The top 10 EU markets are completed with Italy, the UK, Romania, Czech Republic and Finland, each contributing a little over more than 3 % of the EU demand for mobile machinery. Other EU28 Member States absorb the rest (15 %) of the EU apparent consumption.

However some clear differences in market size appear between the various product lines. Poland, Austria and Sweden are particularly important for construction, lifting and municipal equipment but much less so for agricultural machinery. Agricultural machinery markets appear to be more fragmented - the top 10 markets represent only 78 % versus 93 % for construction machines.

Growing the EU market size has become a challenge

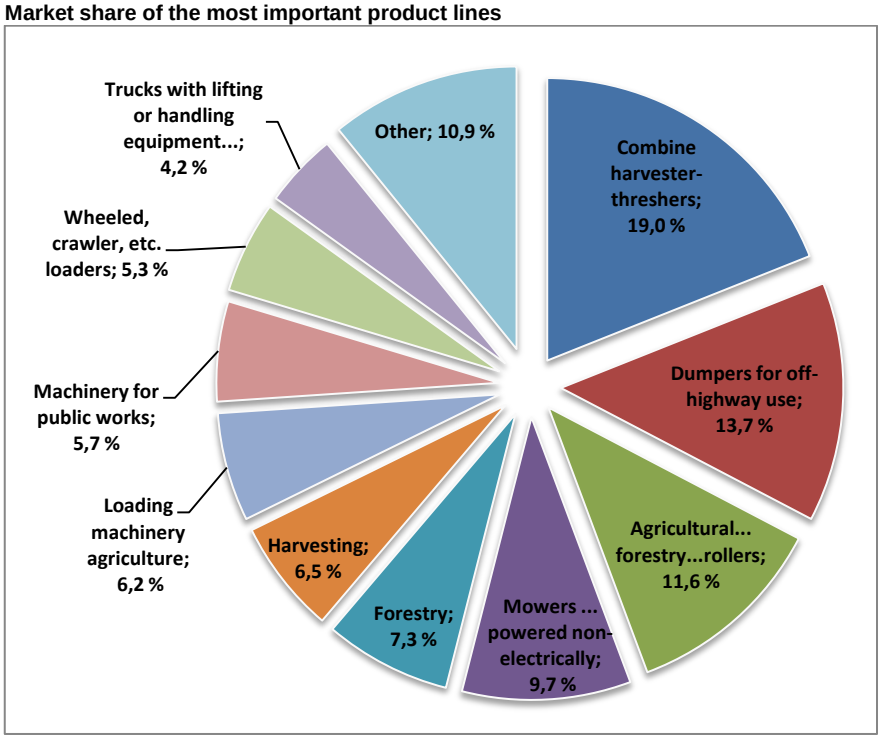
Over the last 10 years (2004-2013), the EU market has been challenging for mobile machinery producers – and in the period covered even recorded a slight decline. The overall EU apparent consumption for mobile machinery has dropped, following an initial strong expansion (41 %) in the years prior to the economic and financial crisis. At its trough in 2009, the EU apparent consumption fell to just over half (56 %) of 2007 total value. In the years 2010-2011, consumption partially recovered, but still below pre-crisis records (approx. € 9.2bln in 2007). In the last 3 years (2011-2013), the EU market has stabilised and signs of growth have been rare.

Figure 2.7 **Market trends – in € m (2004-2013)**



Source: Ecorys based on Eurostat PRODCOM

Figure 2.8 **Market share of the most important product lines**



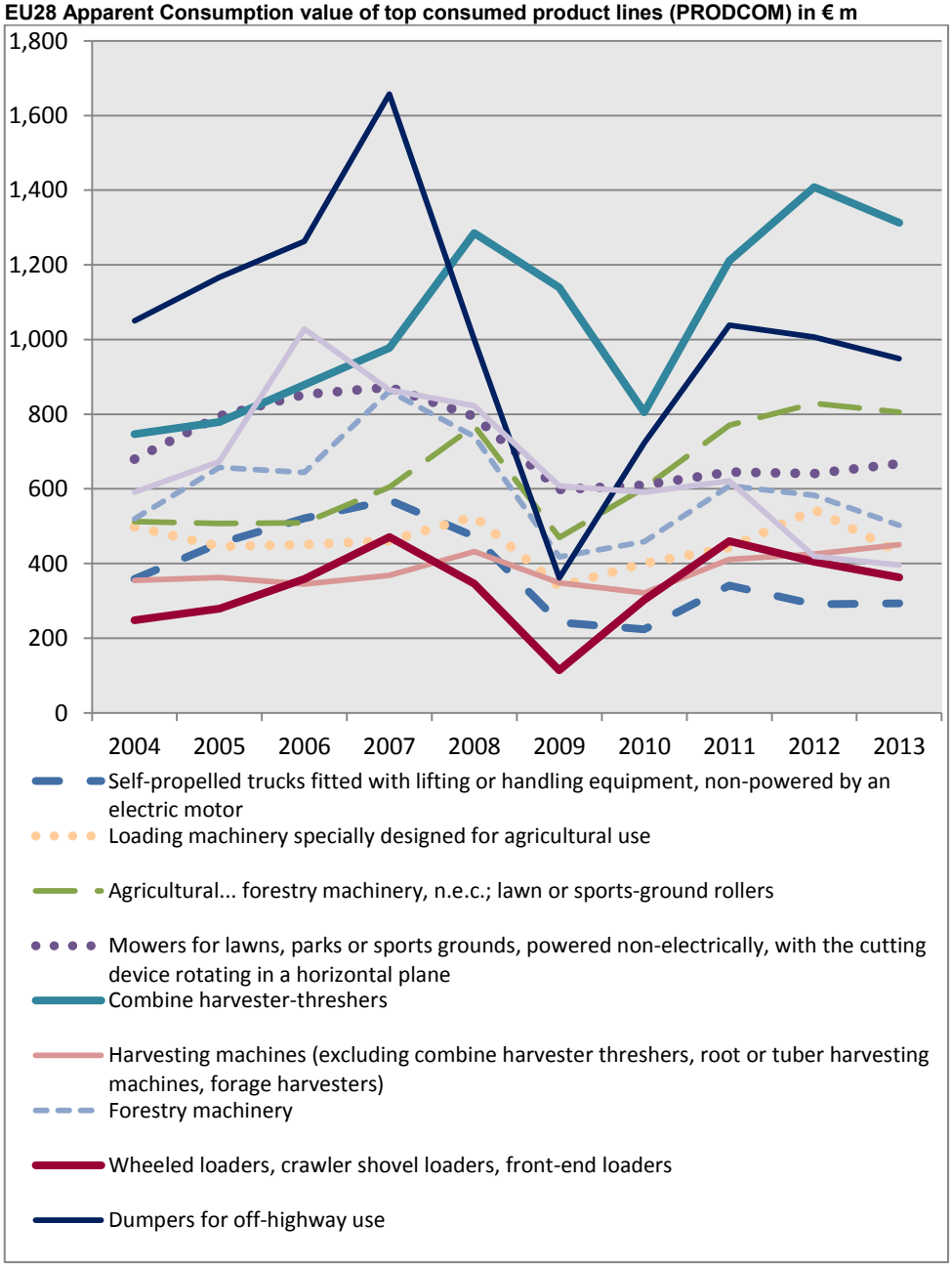
Source: Ecorys based on Eurostat PRODCOM

In 2013, the 10 most important mobile machinery product lines for the EU market made up 90 % of the EU market value. Agricultural and forestry machinery product lines generate the largest sales volumes. Most important volumes come from “combine harvester-threshers”, “agricultural…forestry machinery, lawn rollers”, “mowers for lawn, parks or sport grounds”, “forestry machinery”, “harvesting machines”; and “loading machinery specially designed for agricultural use”.

EU market recovery has been partial only, especially so in the construction segment

When reviewing these markets over time (2004-2013), the apparent consumption trends for the highest value product lines seem to vary even more than EU production trends. Although a dip in apparent consumption of all categories can be observed as a consequence of the 2008 economic crisis across all product lines, the recovery since has been stronger in some than in others. Apparent consumption surpassed quickly the pre-crisis volumes for "combine harvesters-threshers" or "agricultural, forestry machinery, lawn rollers". In other cases, the recovery was much weaker and the EU apparent consumption remains well below the pre-crisis levels e.g. for "self-propelled trucks fitted…by an electric motor". Taken together, mobile construction machinery appears to be slower in recovering than sales of agricultural machinery, most likely due to the prolonged effect of the crisis on the construction sector. This slow recovery is also expected to be related to public spending cuts, that were implemented in a wide range of Member States following the years after the outbreak of the crisis – affecting in particular municipal equipment and machinery for public works.

Figure 2.9: **EU28 Apparent Consumption value of top consumed product lines (PRODCOM) in € m**



Source: Ecorys based on Eurostat PRODCOM

2.4 EU market outlook – some trend extrapolations

Making a full market forecast lies outside the scope of this study. Nevertheless, some baseline information is needed in order to better understand what future impacts of harmonisation policy initiatives could be. Hence, some trend extrapolations have been made and discussed with the Commission and industry associations during the workshop held on 24th June 2015. These trend extrapolations point to differences between the two broader segments identified: the construction segment (including construction, municipal and lifting/handling machinery) and the agriculture/forestry segment (containing mobile machinery for agricultural, forestry and gardening use).

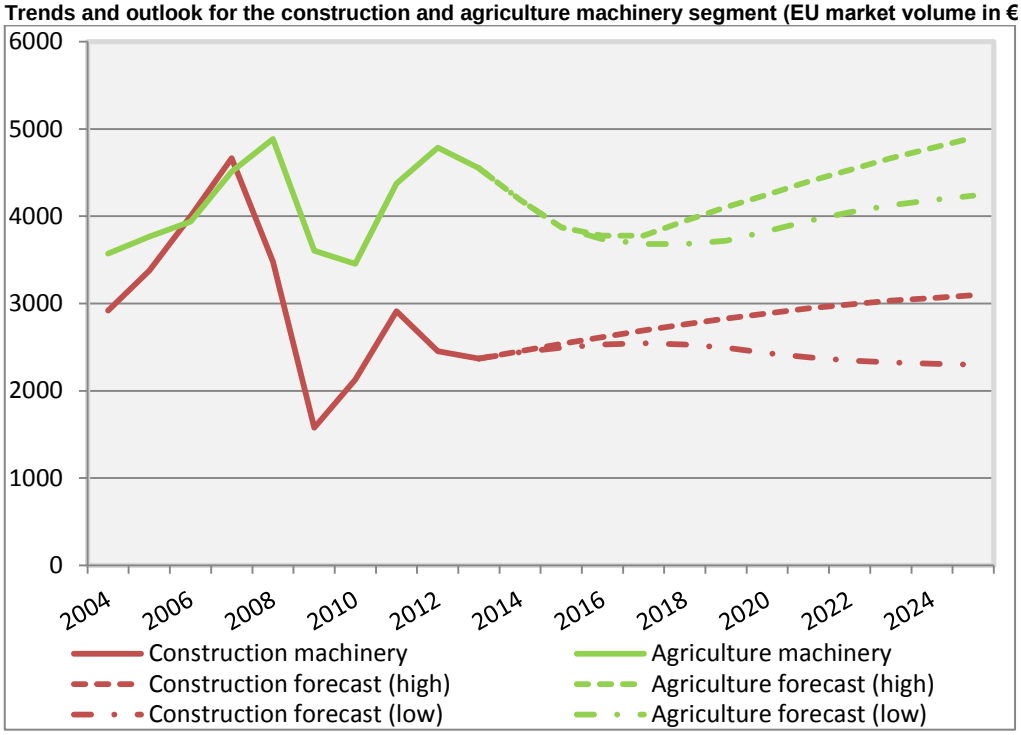
Market outlook is rather bleak – especially so for the construction segment

The EU market demand for the construction segment is likely to be more volatile, pointing towards a higher cyclical nature in conjunction with wider economic performance of Member States. The challenges faced by the construction sector in many MS caused a great reduction in the volumes of construction machinery sold in the EU28. However, in the 2010-2012 period, this market segment has recovered strongly to approx. € 2.2 bn in 2013 but has not managed to reach its 2007 record-high performance. Short-term industry forecasts see a consistent growth of around 3 % for the following 3 years for this market segment[26]. In the mid-term, industry experts are expecting the output of the sector to score around pre-crisis levels, in the best case scenario. This would be achieved by an average annual growth of about 2 %. However the materialisation of this scenario is strongly dependent on the overall economic performance of the EU. In a more conservative low scenario, the EU market for these product lines could well shrink with an average annual rate of -0.8 %.

For the agriculture segment, the outlook is slightly more positive. Starting from a market size of approx. € 4.5 bn, the short-term outlook is still negative[27], the longer term high growth scenario for the coming decade points to around 2.5 % growth on an annual basis – which would lead to pre-crisis volumes by 2025. However, a more prudent outlook points to only average growth rates of 0.9 % in the coming decade, which would be insufficient to reach pre-crisis levels. Important drivers for this market volume would not only be the general economic situation, but also the evolution of commodity and product prices. For example, cereal prices are at the time of writing (mid-2015) currently low – much lower than 2013 levels, which depresses sales of combine harvesters.

[26] CECE, annual economic report, March 2015
[27] CEMA. 2015: Cautious outlook for Europe's agricultural machinery market. January 2015

Figure 2.10 **Trends and outlook for the construction and agriculture machinery segment (EU market volume in € m)**



Source: Ecorys based on Eurostat Prodcom

2.5 Conclusions on industry and market assessment

The mobile machinery industry cannot be statistically defined as a 'sector', but consists of a series of products across sectors (such as agricultural machinery (excl. tractors), construction machinery, garden equipment, municipal equipment). The segment consists of a substantial amount of SMEs which however do not account for a large share of the industry's turnover. Main products (in terms of value in 2013) are combine harvesters-treshers (16.9% of EU production value), dumpers for off-highway use (14.8%) and machinery for public works (13.1%). The total production value in the EU amounts to €10.3bn concentrated mainly in a small number of Member States. Germany (44.8%) is the main producer followed by Italy (13.8%), the United Kingdom (13.2%) and France (10.2%).

The sector is also a strong exporter, selling 45% (€4.6bn) outside the EU. At the same time about € 1 bn of machinery is imported into the EU. Consequently, mobile machinery of a value of € 6.7 bn needs to be made fit-for-use in the EU (and is therefore affected by non-harmonised legislation). Market trends show a peak in terms of market size just before the outbreak of the economic crisis which hit the sector hard in 2009. The agricultural[28] machinery segment is slowly recovering, but still not expected to reach pre-crisis levels before 2025. The construction[29] machinery segment recovered after 2009, but is expected to remain rather stable considerably below the crisis peak level.

[28] Including gardening and forestry machinery
[29] Including municipal equipment

3 Overview of the problem

The lack of harmonisation of the requirements for the road circulation of mobile machinery in the EU causes various problems for different types of stakeholders: mobile machinery manufacturers and dealers, downstream industry and citizens at large. In this chapter, the problem is framed through a conceptual model, followed by a further detailed elaboration on the existing requirements for road circulation. Building on this frame, an assessment of the direct and indirect cost of requirements is made. The problem is elaborated from the perspective of both industry (direct and indirect costs) as well as other actors (including the functioning of the Single Market). It includes quantitative (for direct costs) and qualitative (direct and indirect costs) information. Moreover at the end of this chapter, a baseline scenario is developed assuming no-EU policy action.

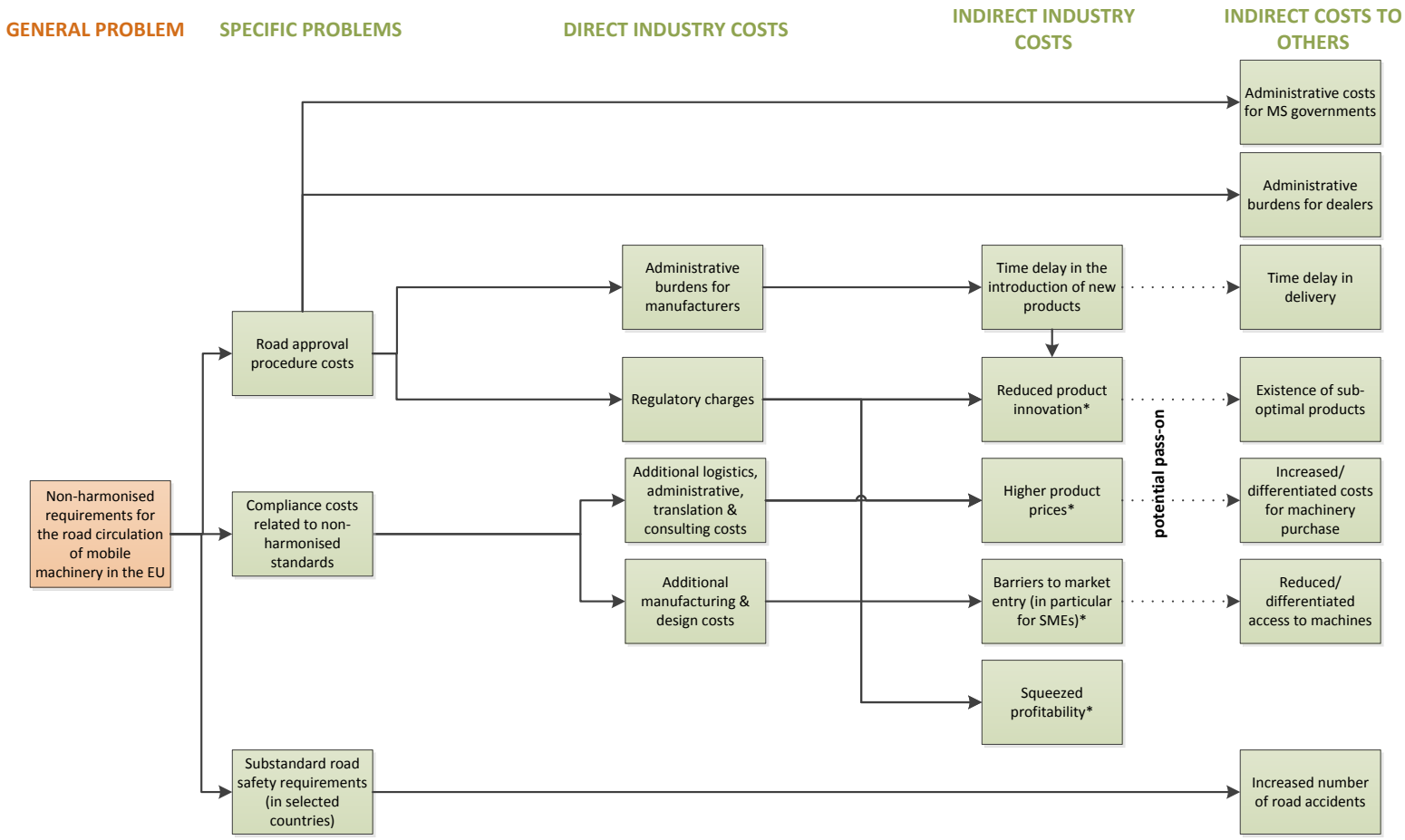
3.1 Overview of the problem – the conceptual model

As stated above, the lack of harmonisation of the requirements for the road circulation of mobile machinery in the EU causes various problems for different types of stakeholders. A basic problem tree of the issue is shown in the form of a causal chain below (figure 3.1 overleaf), with the core problem presented on the left. The non-harmonised requirements for the road circulation of mobile machinery lead to direct industry costs, but also indirect industry costs. Depending on the market structure and market power, and hence the pass-on capabilities of the firm or sector, they also lead to indirect costs to others (mainly downstream clients and road users).

The general and specific problems: non-harmonised requirements

The general problem of non-harmonised requirements for the road circulation of mobile machinery in the EU causes a number of specific problems including 1) road approval procedure costs; 2) high compliance costs related to non-harmonised requirements; and 3) substandard road safety requirements (in selected countries). All of these specific problems can be translated into operational problems, which have their direct and indirect costs for industry as well as for other stakeholders and therein affect the functioning of the internal market.

Figure 3.1 The conceptual model



Source: Ecorys; **indicators of competitiveness*

The problems are further elaborated upon in the subsequent sections. Before going into depth and quantifying them, a brief description/overview is provided below.

Ad 1) Road approval procedure costs

Road approval procedure costs are costs which occur when homologating a machine on a market for manufacturers in the form of administrative burdens (processes to comply with requirements in terms of documentation, testing etc.) and regulatory charges (charges to approved documents etc.), for Member State governments and authorities in the form of administrative costs (staff following the processes, inspections etc.) and for dealers who do not have access to already homologated machines for their markets (in the form of conducting the processes otherwise manufacturers do).

Administrative burdens for manufacturers are not only a hassle to manufacturers, but can also lead **to time delays** in the introduction of new products. Such time delays may then be passed on to downstream clients which only receive their requested machines at a later stage. E.g. in agriculture, serious consequences need to be faced if a machine does not arrive on time for the harvesting season. The time needed to get the type approval varies from 1 to 12 months depending on the Member State, and takes on average about 15 weeks[30]. In addition, time delays have an indirect impact on **product innovation** as they reduce available time for such innovation processes. Consequently, the industry risks to be less competitive in terms of product quality, which can affect the downstream market in terms of sub-optimal products.

Regulatory charges such as testing and third-party testing or other inspection activities increase the costs of manufacturers to bring a product on the market. Consequently these can hamper **product innovation** as money is used in different ways. This could then lead again to reduced availability of optimal products for downstream clients. In addition, regulatory charges may also lead to **higher product prices** (if companies are able to pass-on the costs) or otherwise **squeeze the profitability** of products. In addition regulatory charges can be perceived as such a burden to manufacturers that they **act as barriers to market entry**. This is particularly the case for SMEs which need to build up the full capacity to enter markets. Such capacity often covers a large part of their activity. Individual market entry barriers then consequently lead to reduced or **differentiated access** to certain types of machines for downstream clients. Having such differentiated access throughout the EU stays in fundamental conflict with the Single Market.

Ad 2) Compliance costs

In addition to the road approval procedure costs, the non-harmonisation of requirements in the EU causes additional compliance costs when serving more than one national market. These include:

- **Additional logistic costs** (transfer from the dealer/branch to the test facilities or from the factory to the place where the local agency representative will perform the tests); **administrative costs**, **translation & consulting costs**;
- **Additional manufacturing & design costs** (including resources dedicated to design and production of mobile machinery variants).

As for the regulatory charges, these compliance costs impact **product innovation**, **product prices**, **market entry and profitability**. Depending on the market situation in each of the national markets, these costs can lead to reduced profitability of the manufacturers or higher prices for downstream clients. Having different requirements in each Member State leads to a duplication (or

[30] CEMA, FEM, CECE, EGMF, EUnited Municipal Equipment (2013): Position Paper on Harmonisation of the Requirements for Non-Road Mobile Machinery Occasionally Travelling on Public Roads; Ifo (2001): Restrictions of the Free Circulation of Off-road Machinery in the EU; Interviews with NRMM manufacturers

multiplication) of compliance efforts for manufacturers. While large manufacturers are seen as being able to cope with such complexity to cover the whole EU, **SMEs perceive such differences often as entry barriers** and thus often prefer to focus on their home countries. This leads to decreased diversity in companies and products on the national markets and therefore **differentiates the level playing field for downstream competition** and as such **reduces the functioning of the Single Market**.

Ad 3) Substandard road safety requirements (in selected countries)

A lack of harmonisation of the requirements for the road circulation of mobile machinery affects MSs with substandard safety requirements, which might cause an **increased risk of road accidents involving mobile machinery**. However, it is not necessarily the non-harmonisation but rather the low safety requirements in selected countries which can cause such road accidents.

Through the harmonisation of requirements, the safety requirements in these MSs could be improved, which in turn would decrease the number of road accidents caused by mobile machinery. Much would depend however on the level at which EU requirements would be set. High requirements would indeed allow safety to increase. Evidently, setting low requirements would potentially lead to a further increase in the number of road accidents.

In summary: potential benefits of harmonisation

Harmonisation of the requirements for the road circulation of mobile machinery would not only provide a **consistent high level of safety on the road** for mobile machinery across the EU, but also increase **uniformity for operators** when using mobile machinery, create a **level-playing field for all** (also international) manufacturers and dealers and clients, as well as **facilitate the design, testing, manufacturing, purchasing, operating and reselling of machines**. To assess the magnitude of such impacts of harmonisation, it is first needed to assess the core problem in more detail including its quantification.

3.2 Existing requirements for the road circulation of mobile machinery

The starting challenge when dealing with the road approval processes for mobile machinery is that it is not defined as a sector, but in most legislations defined in a “negative” form according to specific mobile machines being part of a rule due to certain specifications (e.g. weight, size etc.). Consequently, already within an individual MS it is difficult to define the set of requirements for all mobile machines. In addition to this, further complexity is added due to the differences between MSs and limited acceptance of each other's rules.

This section first describes the diversity of selected Road Approval Certification schemes, building on the IFO (2001) study as well as complementary information including the Harmonised proposal for Road approval in the area of emissions[31]. It then provides a qualitative assessment of existing requirements across the EU.

3.2.1 Identification of selected Road Approval Certification schemes

There are two main types of National Road Approval Certification schemes:

- National third-party certification by a notified body;
- Single vehicle approval procedure.

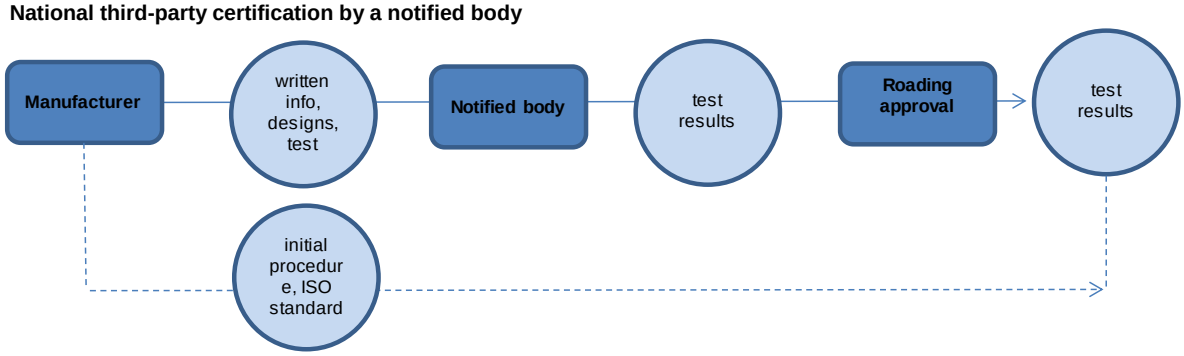
[31] COM(2014)582 final

National third-party certification by a notified body

In case of the third-party certification by a notified body, the machines' manufacturer needs to provide the notified body with **written information on the machine, specific designs and testing results** (emissions, noise etc.) which indicate that there is conformity with existing regulations[32]. Then independent tests are carried out to evaluate the results. The results are then sent to the roading approval body, which decides on the road approval of one specific type of off-road machines. National type approval is more common with larger series and after the full launch of a new model.

National **third-party certification** by a notified body **is rather costly** and can be a **time-consuming** procedure, as it involves many actors (independent organisations, the manufacturer, the notified body and the roading approval body). In addition there is an element of unpredictability, as the manufacturer is not sure if his machine will be approved or not, and if so when. A simple diagram showing the steps of third-party certification by a notified body can be found below.

Figure 3.2 **National third-party certification by a notified body**



Example of Germany

In Germany the third-party asks the manufacturer for the provision of written information on the machine, specific designs and testing results which indicate that there is conformity with existing regulations[33]. Moreover, independent tests are carried out to evaluate the results. The notified body's test report based on the company's information is the document which is transferred to the public administration responsible for the national roading approval regulation. The procedure is concluded if this public body decides on the road approval of one specific type of off-road machines.

In order to be able to apply for National type approval, the manufacturer or dealer needs to provide information about ISO9002 equivalent standard to the road approval body (initial procedure).

Example of Italy

For manufacturers producing more than 250 units per year the Ministry of Transport checks the report of the regional CPA bureau (certifying body). If the Ministry of Transport decides on the roading approval, the decision is binding for all of Italy.

[32] Ifo (2001): Restrictions of the Free Circulation of Off-road Machinery in the EU
[33] KBA (2016): http://www.kba.de/DE/Fahrzeugtechnik/Typgenehmigungen/typgenehmigungen_node.html ; Interview with NRMM manufacturer

Example of Sweden

The manufacturer of the machine has to provide a certain amount of technical documentation and certification that other systems and components fulfil the requirements of the legislation and must certify that the machine complies with applicable legislation[34]. Additional extensive practical tests are to be conducted at the discretion of the notified body and paid by the manufacturer. The assigned type designation has to be reported to Swedish Road Authorities as a basis for registration.

Market restrictions for small manufacturers due to burdensome national type approval procedure - example provided by EU NRMM manufacturers

The efforts required for type approval in some Member States are very high. Reviewing such an approval for highly specialised machines requires specific expertise, which is not always available at the authorities concerned; it can lead to delays and less prioritisation of the files – and thus delay in type approval. Such delays can last up to 6 months, however on occasions several years (meanwhile single approval is needed). Single approval is also an issue and also needs experienced manufacturers as well as Member States authorities. Delays are problematic especially for smaller players (e.g. producers of very specialized machines), who might no longer be able to engage in such an administrative exercise for a long time'. As a result, they might focus stronger on home markets. This could lead to limited choice of machines on the European market.

Single vehicle approval procedure

In case of the single approval procedure, the manufacturer needs to provide the notified body with **written information on the machine, specific designs and testing results** (emissions, noise etc.) which **indicate that there is conformity with existing regulations**. The notified body takes the decision about road approval and informs the public body.

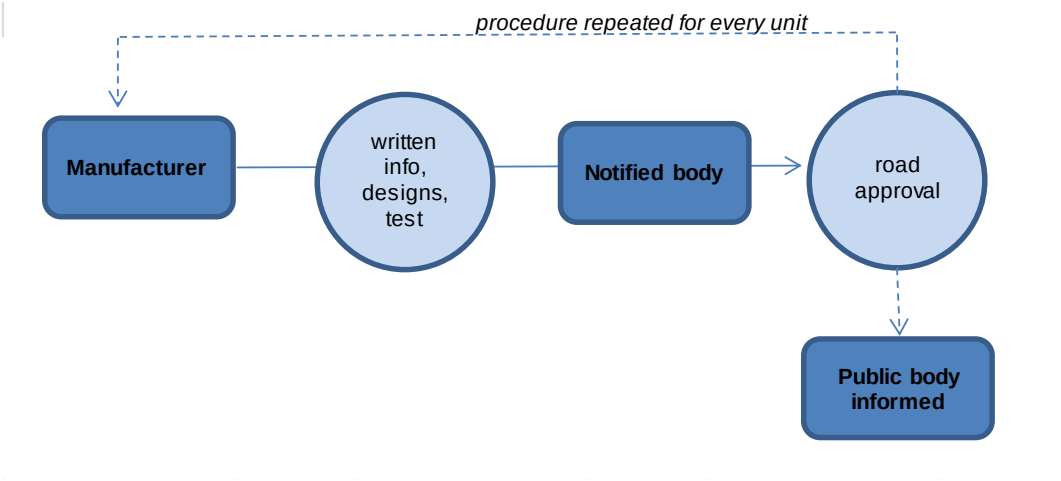
Single approval happens often after the launch of a new model prior to third-party certification or in case of smaller batches which do not justify type approval.

The single approval procedure, which requires a conformity assessment for each unit by a notified body tends to be faster than type approval, however it is resource-intensive as it needs to be repeated for every unit and therefore costly. In addition, it leaves room for interpretation, especially when done at the dealer's location instead of the manufacturer's site.

A simple diagram showing the steps of single vehicle approval certification can be found below.

[34] SMP Swedish Machinery Testing Institute (2016): https://www.smp.nu/en/Inspection/Services/WorkEnvironment/Import/Sidor/default.html

Figure 3.3 Single vehicle approval procedure



Example of Germany

Germany requires third-party certification but the approval authority is not involved and no initial procedure is needed. A notified body creates a test report which confirms the conformity of one tested machine. Further machines only have to be checked on conformance to the machine described in the test report. Results are not binding and there is some room for interpretation as any other expert can come up with another conclusion. Single approval procedure is to be repeated for each unit sold.

Example of Italy

There is a type approval procedure (omologazione limitata), which is applied to machines with roading approval for a limited number of up to 250 units per year only.[35] This procedure allows some exemptions (e.g. weight, lights etc.) from the rules applied on vehicles, which most of mobile machinery usually needs. The third-party testing is carried out by CPA, a public authority under the Ministry of Transport. Roading approval is provided by one CA office for all of Italy.

Example of Sweden

In Sweden the manufacturer has to certify that the machine in question fulfils certain requirements (e.g. braking, steering). In addition the notified body has to physically check and where necessary make tests of each individual machine.

Work machines Class II (designed for speeds lower than 30 km/h) do not have to be registered unless it is used for transport of goods on the road.

3.2.2 Assessment of requirements

Technical requirements for mobile machinery can differ between MSs in terms of the requirement itself or the processes needed to get approval. Both dimensions may generate difficulties. In the following, first an overview will be provided on overall level of requirements by Member State. This is followed by an assessment of the requirements themselves.

[35] ENAMA (2016): http://www.enama.it/it/omologazione_naz.php; Italian Ministry of Infrastructure and Transport (2008): http://www.gazzettaufficiale.it/atto/serie_generale/caricaDettaglioAtto/originario?atto.dataPubblicazioneGazzetta=2008-07-12&atto.codiceRedazionale=08A04605&elenco30giorni=false; Enama.it (2016): http://www.enama.it/it/omologazione_naz.php

Overview of requirements by Member State

Providing an overview on how demanding requirements are across the EU is a challenging task due to various factors:

- The **perception** of how demanding a requirement is **depends on the location of the factory** and the main market addressed;
- **Requirements can be demanding per se** (this means that a requirement is difficult to achieve or costly) or demanding based on differences between Member States (the requirement is easy in itself, but due to the differences across Member States it becomes difficult);
- **Requirements (enforcement) may change over time**.

Taking these factors into consideration, a qualitative assessment has been made on how demanding different Member States are 'in general' before looking into the specific requirements themselves. Thereby MSs have been classified as technically and/or administratively more or less demanding for NRMM. The table below lists Member States, makes an assessment, provides comments on the reasoning and gives an outlook on future expectations on how the requirements will change. The assessment is based on expert judgement, interviews and validated through an analysis of the survey responses. Based on the feedback received, the requirements for NRMM are considered **most demanding in Germany, France and Italy** – which are amongst the most important markets for this type of machinery (see Chapter 2 above). A detailed legislative overview of technical requirements for these three most demanding Member States can be found in Annex II.

The following countries were classified as medium in terms of requirements: Austria, Belgium, Spain, Luxembourg, Portugal and Romania.

It is important to stress that even if requirements were classified as little demanding, the NRMM manufacturers' overall workload related to the necessity of having an up-to-date overview of requirements and correctly applying them in each MS is very high and expected to rise even more in the future. Especially the requirements in new MS are expected to become more complex and strictly enforced in the coming years.

Table 3.1 **Overview of requirements by Member State**

Member State	Overall requirements	Comments	Future expectations
AT	▲▲	Demanding requirements, but acceptance of German third-party testing.	→
BE	▲▲	Demanding requirements, max allowed weight on tracks is 10.000 kg while in FR and DE 12.000 kg is allowed.	→
BG	▲	Not yet very demanding requirements, but expected to become more burdensome in the future.	↑
CY	▲		→
CZ	▲	Not yet very demanding requirements, but expected to become more burdensome in the future.	↑
DE	▲▲▲	Very demanding requirements, many differences in comparison to other MSs, DE is working on a new StVZO.	↑
DK	▲		→
EE	▲	Not yet very demanding requirements, but expected to become more burdensome in the future.	↑
ES	▲▲	Demanding requirements, differences in comparison to	→

Member State	Overall requirements	Comments	Future expectations
		other MS, Spanish decree[36].	
FI	▲		→
FR	▲▲▲	Very demanding requirements, many differences in comparison to other MS.	→
EL	▲		→
HR	▲	Not yet very demanding requirements, but expected to become more burdensome in the future.	↑
HU	▲	Not yet very demanding requirements, but expected to become more burdensome in the future.	↑
IE	▲		→
IT	▲▲▲	Demanding requirements, requirements might differ depending on the region, many differences in comparison to other MS, IT is increasingly applying EC regulations.[37]	↑
LT	▲	Not yet very demanding requirements, but expected to become more burdensome in the future.	↑
LV	▲	Not yet very demanding requirements, but expected to become more burdensome in the future.	↑
LU	▲▲	Demanding requirements, differences in comparison to other MS.	→
MT	▲	Not yet very demanding requirements.	→
NL	▲	Not yet very demanding requirements.	→
PL	▲	Not yet very demanding requirements, but expected to become more burdensome in the future, registration depending on driving license and speed.	↑
PT	▲▲	Demanding requirements, but expected to become more burdensome in the future.	↑
RO	▲▲	Demanding requirements, expected to become more burdensome in the future.	↑
SE	▲		→
SI	▲	Not yet very demanding requirements, but expected to become more burdensome in the future.	↑
SK	▲	Not yet very demanding requirements, but expected to become more burdensome in the future.	↑
UK	▲	Not yet very demanding requirements.	→

Legend

▲*….little demanding*

▲▲*….medium demanding*

▲▲▲*….very demanding*

Based on the information provided by companies in the survey as well as individual Member State research, an overview can now be provided of the burdensome requirements for the NRMM

[36] This is a paper work exercise and requires only a minor inspection of the product. For each product the manufacturer or customer can pay 900 Euros for road registration but information to be collected include drawings, bills of materials, wiring diagrams, brake tests etc. can run into hundreds of pages and does not include any physical testing.

[37] Interview with NRMM manufacturer

manufacturers across Member States. Building on this, a further elaboration on the most demanding Member States, France, Italy and Germany can be made.

Key technical problems across Member States

Manufacturers of NRMM from different countries are facing similar problems. Most importantly, each Member State has its own requirements and **obtaining an overview of the latest legislation** is **very time consuming** (especially for companies from outside the EU). This task is even more challenging, as each Member State has its own language to use for homologation documents. In the best case, documents in English are allowed. However in other countries (e.g. in France), the documents need to be provided in native languages. This increases the work load and adds costs for translation.

Especially challenging for NRMM manufacturers are requirements concerning:

- **Brake efficiency** and **maximum admissible velocity** (different configurations for engine and hydrostatic transmission) on road;
- Different requirements concerning the **admissible masses and permissible dimensions** of the vehicle;
- Different requirements concerning **positions and number of lights**.

In addition, in most of the Member States either an extra vehicle is required to escort the NRMM (e.g. combine) on the road or an extra vehicle needs to carry the header.

The current situation **also impacts the second hand machinery market**. Because of the speed limits and corresponding brake requirements, it is difficult to sell a second hand machine in another Member State than it was produced for.

NRMM dealers are affected as well. Due to the missing European regulation the sale of used machines is limited to the national market of the dealer, as it would not make sense to align a used machine with different national road circulation requirements.

Key technical problems in France

The most frequently mentioned burdensome requirement in France is the **speed limit**. The maximum speed for a NRMM of over 2.55 m is set at 25 km/h, no matter if the braking system, steering or other machine's components are designed for higher speed. In comparison, some other countries like Germany, Netherlands and Denmark have the speed limit set at 40 km/h. Furthermore, it is difficult to maintain the right national maximum speed throughout the lifetime of a machine, for example after the change of a main component or after a full software reboot.

In France, the **homologation process** itself is very **time consuming.** In order to finalise the French homologation, two steps are required: 1) practical tests with UTAC; 2) inspection with DREAL. This procedure is considered lengthy and (e.g. for a combine harvester) takes up to 6 months. In addition, the cost of using a homologation specialist and the cost of approval by UTAC are excessive, especially for small NRMM. High volumes need to be guaranteed in order to prevent extensive financial burden for the manufacturer, which could hinder the entry of the company into a new sector/market.

Different requirements on **weight limits** prevent companies from selling the same NRMM in other European countries. The companies incur extra cost, because of e.g. limited weight per axle (see example section 3.3.3).

In comparison with other countries, France has also more **burdensome lighting regulations** - specifically with regard to light positions. This often compromises the optimal lighting position of the NRMM. Lights often need to be designed to fold (which generally weakens the support structure) or remain in a position where they are more likely to not be damaged when the NRMM is in use. Mandating R65-R10 beacons can also be problematic as they are often close to the operator and distract him in confined places, because they are too bright. In addition, it is difficult to design a machine according to ISO visibility standards and at the same time according to each specific national road requirement.

Key technical problems in Italy

Different interpretations from NRMM inspectors and **varying requirements in each region** make Italy a very complex market. Due to misunderstandings, machines are sometimes stopped from working, thus causing additional costs for the owners and dealers. An example was mentioned, where a machine was stopped, because the date on in the manual did not match the date on the data plate. No legislation exists that would regulate this, so it was a misinterpretation of the inspector that caused over 15 hours of discussions between all parties involved in order to clarify the situation.

The Italian Road code takes into account most parts of tractors directives, however it is difficult to apply them for some types of NRMM (e.g. combined harvesters).

Other burdensome technical requirements include:

- Italian authorities **only accept a specific design of tow-hook** (Cuna type, used in variable reach trucks). This could be considered a measure which favours some (domestic) producers over other (foreign) producers[38];
- **Stiff coupling and rotating pulling eye** required in Italy is different from the ones used in other Member States;
- For towing machines there exist strict requirements regarding: the lifting system of front attachment, fuel cap, number plate support and lighting, cockpit warning lights and symbols, additional requirement on hydraulic service brake pedal, rating label (fonts and info), additional instruction sheet, and left mirror;
- In Italy once **every 2-years an audit** by an organisation appointed by the government takes place in order to review the management system of the company (irrespective of number of machines sold). This generates additional costs for the manufacturer, which often cannot be forwarded to dealers/customers.

Key technical problems in Germany

The German authorities require all machines to have road circulation certification (even if the machines are not intended to go on road). This requires **every product to be inspected** before it leaves the factory by the German authority. The costs of the inspection and any exceptions (items that do not meet the StVZO) are paid by the manufacturer before the product is exported – current examples include each wheel-loading shovel having exceptions to the value of € 2,000 and each back-hoe loader for € 800. In addition each product for Germany requires a **special road kit** with a varying price from € 100 to € 1000 depending on the product (this includes, lever locks, additional marking and different lights).

[38] Interview with NRMM manufacturer

The **dimensions and weights requirements** are very strictly enforced in Germany. The dimensions are limited to: 12 m length, 3 m width, and 4m height. The weight of 2-axle NRMM must not exceed 18 tons. In other Member States larger outer-dimension are permissible. Only in Germany the requirement differentiates between the width of the machine's body and width of the tires.

Because of exceptional dimensions, some NRMM manufacturers have to do a single homologation. The German Technical Inspection Association (TÜV) or any other appointed testing organisation in Germany that validates the safety of NRMM has to see each combine in road configuration, what costs €200 per machine. These **costs are constantly increasing**.

Some of the manufacturers are facing difficulties because of the **language**. TÜV is currently making the third party approval for German national road safety homologation, however it is not translated into other languages what are the requirements for machines to pass the tests. This information is only available in German.

A **secondary steering system** with maximum steering force is required for NRMM (e.g. combine, forage harvester) reaching speed of over 20 km/h. In the case of diesel engine breakdown, being the primary energy source for a hydraulic steering system, it is required that the machine is still steerable. Therefore a secondary energy source for the steering system of NRMM is required. No other Member State requires a secondary steering system, however, many other Member States 'imply' the requirement via indirect means. They may require a certain maximum driver effort at steering wheel to control the vehicle under all circumstances, even if the engine stops. This requirement may then consequently dictate the presence of a backup system.

Overview of the full range of requirements

The overall assessment of the full range of requirements is built on the above Member State assessment, in-depth interviews with pilot companies, as well as the results from the survey. The most demanding requirements categories include: **vehicle performance and control** (especially braking and max. speed), **vehicle dimensions** (max. weight/length/width), **road surface protection** (max. axle loading, max. surface contact pressure), vehicle awareness (in particular lighting, signalling and reflectors), operator vision (including operator field of vision and mirrors) and vehicle design (mechanical (towing) couplings). The following table provides a detailed overview on each category of requirements.

About half of the technical requirements are mainly a hassle for NRMM manufacturers, as they require higher administrative efforts due to differences between Member States. The other half mainly constitutes a rather technical challenge for implementation. For example, vehicle markings are a hassle because there are different requirements for markings across Member States. These markings apply to differences in size, colour, shape. The manufacturer needs ensure that the right markings are placed on the machines. This procedure is not technically challenging, but requires additional logistics, proper sequencing and a high doses of precision. By contrast, braking is a requirement that is technically difficult to implement as it requires much more effort than vehicle markings.

Table 3.2 **Full range of requirements**

Category	Technical Requirement	Overall assessment	Comments/Range	Require-ment (R) or hassle (H)
Vehicle Performance & Control	Steering	▲▲	Appropriate mechanism that allows the driver to maintain the vehicle's steering and modify it easily, quickly and safely is required.	R
	Braking	▲▲▲	Braking performance requirements may depend upon vehicle max design speed. Different requirements regarding breaking lights.	R
	Max. Speed	▲▲	25 – 40 km/h	H
	Speedometer	▲	Every motor vehicle capable of reaching threshold max speed value must be fitted with a speedometer in km/h.	R
Vehicle Dimensions	Max. Weight	▲▲	Depends on the number of axles.	H
	Max. Length	▲▲	12 – 22 m	H
	Max. Width	▲▲	2.55 – 4.5 m	H
Road Surface Protection	Max. Axle Loading	▲▲	Differences depending on the number of axles.	H
	Max. Surface Contact Pressure	▲▲	Differences depending on the MS.	H
	Requirements for Tracked Vehicles	▲	Vehicles must have their tracks fitted with tires or similar elastic elements to prevent damage to the road surface.	R
Vehicle Awareness	Lighting	▲▲	Requirements regarding the position, colours, number and size of lights/lamps.	R & H
	Signalling	▲▲	Differences in colours, size, text etc. depending on the vehicle type.	R
	Reflectors	▲▲	Differences in the position of reflectors.	R
	(Rotating) Warning Beacons	▲▲	No indications.	R
Vehicle Markings	Registration Plate	▲	Different colours, position on the vehicle depending on the MS.	H
	Max. Speed Marking	▲	Differences in size, font, shape etc.	H
	Warnings to Other Road Users	▲	Various signals and/or reflectors.	H
	Other Plates / Markings	▲	Differences depending on the MS.	H
Operator Vision	Operator Field of Vision	▲▲	See below (mirrors).	R

Category	Technical Requirement	Overall assessment	Comments/Range	Require-ment (R) or hassle (H)
	Mirrors	▲▲	Differences in the position and number of compulsory/non-compulsory mirrors depending on the MS.	H
	Windscreen Wipers & Washers	▲	Are required in most of the MS.	R
	Cabin Glazing	▲	Differences in the strength of the glass required.	R
Operator Environment / Protection	Cabin Seat, Door, Heating/Ventilation	▲	Seat must be anchored to the vehicle structure. Doors should have locks and fixing members so as to prevent the unwanted opening.	R
	Operator Seat Belt	▲	No indications.	R
	Vehicle Roll-Over Protection	▲	No indications.	R
Vehicle Design	Tyres and/or Tyre Rims	▲	Tires, either new or rethreaded, must always maintain statutory markings and must not suffer abnormal deformation, cracks or other signs that demonstrate the take-off of a layer or tread.	H
	Fenders / Mudguards	▲	Specific requirements for vehicles, particularly above a certain max. speed.	H
	Fuel Tank / Cap	▲	No indications.	R
	Mechanical (towing) Couplings	▲▲	Depending on weight and requirements determined in national regulation.	H

Legend

▲….*little demanding*

▲▲….*medium demanding*

▲▲▲….*very demanding*

3.3 Direct industry costs

Direct industry costs (or further also 'direct costs') are costs which directly occur for the industry due to regulatory requirements. Direct industry costs are also understood to be compliance costs. They consist of **administrative burdens, regulatory charges, additional logistics, administrative translation & consulting costs** as well as **additional manufacturing & design costs**. A further distinction can be made between 'staff costs' and 'other direct industry costs'. Staff costs are assessed in terms of time needed for compliance and the respective staff costs (=wages). 'Other direct compliance costs' are costs for e.g. purchasing information, administrative fees etc. Based on the identification of the problem, staff costs and other direct costs for compliance occur for mobile machinery manufacturers in the EU in the following seven compliance activities:

1. **Staff familiarisation with the legislation** on national road safety requirements (annual cost);
2. **Type approval body testing / third-party testing** to meet national road safety regulatory requirements;

3. **Product design / development costs** to meet national road safety regulatory requirements;
4. **Internal company product testing** to meet national road safety regulatory requirements;
5. **Administration** required to meet national road safety regulatory requirements;
6. **Manufacturing of safety features** to meet national road safety regulatory requirements;
7. **Product markings and other information** for users to meet national road safety regulatory requirements.

These key compliance activities are considered as unduly onerous for a variety of reasons by industry[39] and the perception from industry is that too many resources are needlessly invested in ensuring that myriad types of national road safety requirements are met. Admittedly, many of the requirements are relatively manageable to deal with when assessed individually. However, from the perspective of the firms interviewed, the cumulative effect of these regulatory differences makes the internal market from the perspective of requirements for road safety far from business-friendly.[40] Moreover, a distinction needs to be made between annual and one-off costs to put a new product on the market. Activities 1 and 5 are mainly annual on-going costs, while the other activities depend on the introduction of a new product.

Quantification of direct industry costs

Direct industry costs are estimated using the Standard Cost Model approach. In the survey of manufacturers, data was collected on the amount of time spent per staff category and compliance activity. In addition information on direct costs (non-staff payments) was collected.

Building on the SCM process, the 'business as usual costs' (BaU) were assessed as well. These describe the amount of costs which would occur even without any legislation. It is assumed that this value is never zero, as manufacturers will always invest at least a certain amount of money and time into the provision of safety equipment and features. The difference between the general costs of legislation and the BaU is referred to as "excess cost". These excess cost should not be confused with the potential reduction of cost based on a specific policy option.

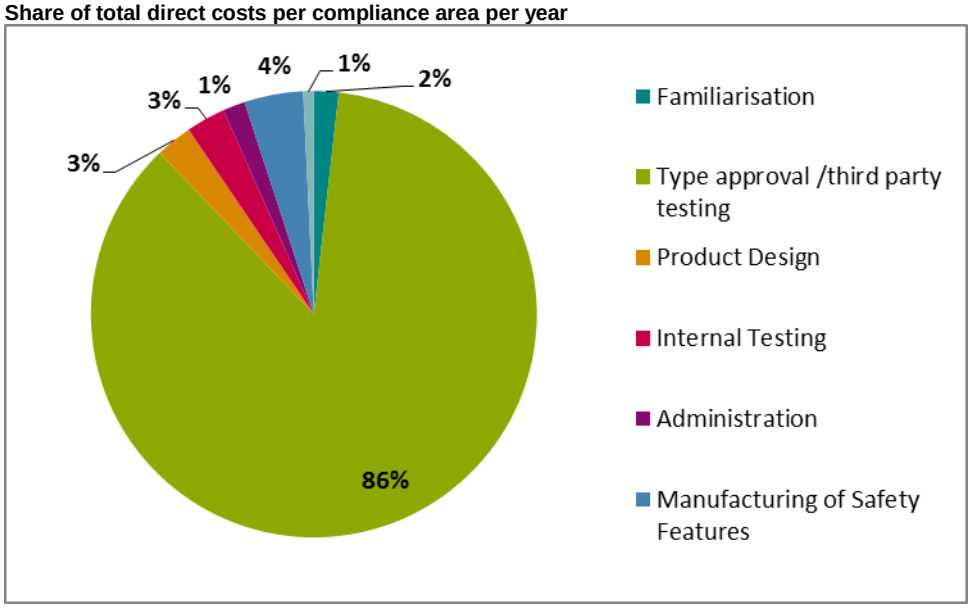
The costs of compliance as well as the excess cost collected in the survey were then extrapolated to the overall population using the share of turnover of the sample of the total apparent consumption of mobile machinery (as described in chapter 2). Further details on the methodological approach are presented in Annex III.

Total direct industry costs for the sector are estimated to be about **€ 90 m** in the EU. This corresponds to about **1.3 % of the turnover**. For an average SME in the sector, this means that annually about € 200,000 are spent directly for compliance with homologation. Large companies spend directly on average about € 3.3 m annually for compliance. Some of these costs would however also occur even in absence of road approval legislation (so-called business as usual costs: it can be assumed that companies would still test their own products and construct them with a certain standard of safety features for their clients). Deducting these 'business as usual costs' leads to excess costs[41] of **€ 57 m** which represents about **0.8 % of turnover.** Such an assessment distinguishing between excess cost and total direct cost can only be made at an overall aggregated level and not for each activity. Hence, in the further quantification of direct industry costs in this chapter, a breakdown is made on the basis of the total direct costs. For the elaboration of the

[39] Based on qualitative survey feedback
[40] Based on qualitative survey feedback
[41] In this study the term 'excess costs' is used to describe the total direct costs of compliance minus the business as usual costs of not having any requirements. This hypothetical "business as usual" scenario needs to be distinguished from the scenario of total harmonisation (as to be achieved through policy options described in chapter 4.

baseline scenario and the quantification of the policy options, however, the excess costs are being used. An average SME has almost € 150,000 excess cost annually for direct compliance. These costs amount to an average of € 2.4 m. for a large company.

Figure 3.4 **Share of total direct costs per compliance area per year**

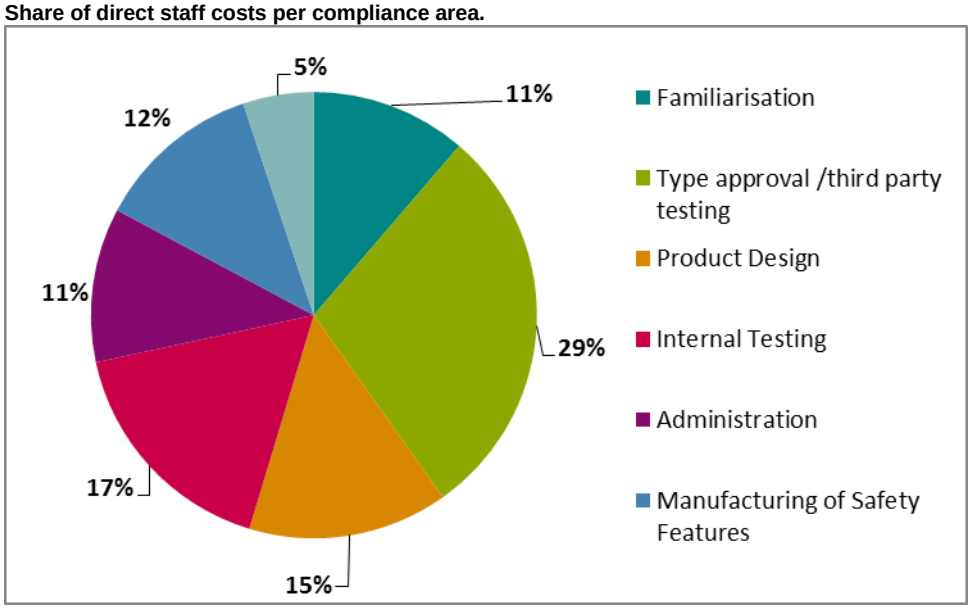


Source: Ecorys based on Sector Survey 2015

The vast majority of these costs are caused by type approval/third-party testing, due to the high direct cost paid in the compliance activity. This is the consequence of on-going innovation and the development of new products which then need to be homologated again. An average SME spends about € 30,000 annually for its staff to prepare and arrange third-party testing. This share is three times as high as for large manufacturers. Large manufacturers on the other hand have much higher other costs for third-party testing, due to the larger number of machines to be tested.

In terms of staff cost, the shares of compliance activities are more equally distributed (still type approval being the highest with almost 30 % of the costs).

Figure 3.5 **Share of direct staff costs per compliance area.**



Source: Ecorys based on Sector Survey 2015

In the following sub-sections, each of the cost categories including a quantification of the current situation are elaborated on the basis of the survey.

3.3.1 Staff familiarisation with the legislation

Staff familiarisation with legislation is the first of all compliance activities. It covers for example tasks such as the 'keeping up-to-date with national legal requirements in the EU' or the 'attending of national standardisation meetings'. To ensure that products manufactured are designed to comply with national legislation for road safety, large firms normally employ internal homologation and specialist engineering personnel that are tasked to ensure that national regulatory requirements are comprehensively understood. SMEs on the other hand need to hire external consultants to assist them with the matters. This activity can then support the successful completion of the subsequent design, build, testing and type approval processes.

However, the differences in national legislation (and regional legislation in countries such as Germany and Spain) appear to make the process of familiarisation unduly complex.

How companies deal with this – example provided by EU NRMM manufacturers

In a first step, companies decide whether to access a market or not. Particularly small companies may already at this stage decide not to familiarise themselves with the legislative requirements of another Member State due to the expected 'hassle'. Larger companies with the aim of supplying most Member States usually have homologation departments also dealing with familiarisation with legislation. This means that teams of usually around five persons spend between 10 % and 20 % of their time to keep up-to-date with national road safety legislation and to ensure that their business systems and colleagues are informed of the requirements. Companies then develop databases covering all relevant requirements.

However, despite the significant number of hours invested in the process, a key point made by even large manufacturers operating across the internal market is that a concrete understanding of all Member State requirements for road safety across a range of mobile machinery products and product groups is largely unobtainable.

A key challenge for firms in terms of familiarisation with the legislation is that national legislative documents vary in terms of clarity. One of the key difficulties in this respect is that mobile machinery is usually 'negatively' defined in legislation[42]. This makes it even harder to understand the legislative landscape across Member States.

Clarity of legislation - example provided by EU NRMM manufacturers

The cost and time intensity of familiarisation with legislative requirements depends to a large extent on the clarity of the regulation. The German road safety legislation, being named as very strict, was often mentioned in qualitative interviews as clear and unambiguous in terms of what is required of manufacturers. Therefore, the expectations of the national type approval bodies can be anticipated in advance (although the requirements themselves are repeatedly criticised). However, other countries appear to have put less emphasis on preventing ambiguity. For example, several manufacturers gave the example of the requirements in Italy where different interpretations seem to co-exist amongst regional inspectors in certain areas of the legislation.

To help cope with such challenges, some large companies have developed internal databases that contain the requirements of all national road safety legislation. They also have developed internal specifications on how to apply these to their product ranges. Such databases are very detailed so that a long list of requirements can be extracted for each Member State. As new products are conceived and developed, the information needs to be screened and re-examined. Manufacturers need to carefully select the countries in which products are being sold to so that appropriate data can be pulled out of the database for their production teams. Where regional legislation applies, this further complicates matters. Clearly, this is a time-consuming process given the vast number of national regulatory requirements in the internal market.

Apart from the hassle of having to update one's knowledge of national (and regional) legislation, the cost of doing so can be estimated to be about **€ 1.6 m** for the sector. This corresponds to almost **2 % of all direct costs**. In terms of staff cost, familiarisation activities even correspond to **11 % of total staff cost**. For an average SME, this means that about € 20,000 are being spent on familiarisation with legislation (annually), whereas an average large enterprise spends an estimated € 50,000 annually on the same activity. These numbers demonstrate the economies of scale that companies have, as their average revenue from mobile machines is about six times higher. However, this economy of scale can be (partially) lost if large companies need to repeat this exercise for a larger number of markets.

3.3.2 Type approval body testing / third-party testing

For mobile machinery, national type approval body testing/third-party testing is a critical step enabling authorised access to the market in many Member States. Such testing usually consists of the following two key steps:

1. Following specified administrative / documentary requests;
2. Following the compliance requests / test procedures of the national type approval / third party body.

Depending on the type of machine and the Member State requirements, documents have to be submitted and/or tests undertaken. While some Member States, such as the UK, do not impose the

[42] Laws refer to rules for machines or vehicles of a certain size, length width etc. but do not name the industry as a whole. This creates differences in the treatment of different types of machines.

requirement of an inspection undertaken by a national type approval body or third-party testing, many countries have established requirements to this effect. Given the non-harmonisation of requirements at an EU-level, roading approval and certification remains a national competence with respect to mobile machinery, without a requirement for mutual recognition. In a limited number of cases, testing results or other approval documents that demonstrate compliance with equivalent national requirements are accepted in other Member States. This is however not the case in most situations. Interviewed manufacturers state that mutual recognition of the same or essentially comparable national requirements already met is often not available either in the form of a legislative principle or as a specified procedure. This results in unnecessary duplication of road safety authorisation requirements for mobile machinery even where it can be demonstrated that similar requirements have been met in another Member State. The consequence is that staff time is invested in parallel product authorisation processes that have similar purposes and the fees imposed by national type approval and third testing bodies need to be incurred on several occasions for the purpose of accessing relevant national markets.

Acceptance of other Member States' test results - example provided by EU NRMM manufacturers

In some cases, different Member States conduct the same or similar tests for mobile machinery. Manufacturers therefore ask for recognition of such test results (mutual recognition). In few cases such as the Austrian and German example, such recognition exists: the German TÜV testing results are usually accepted in Austria. The reasons are a similar high standard as well as the use of the same language. However, similar requirements are no guarantee for acceptance.

The noise record measurements in Germany and France serve as an example. The *official noise record* measurement in Germany (89 dB(A)) is not accepted in France even if the noise requirements are stricter than in France (91dB(A)). The French testing authority UTAC insists on a second testing even with German-tested machines. For pressure leakage, Germany and France have the same requirement. A test of 0.3 bar pressure leakage has to be conducted. The results are however not mutually recognised.

A similar situation can be observed with *brake tests* which in Germany are performed by the TÜV at 40 km/h and not accepted in France. They have to be carried out by UTAC because witness tests are not accepted from one to the other. In Italy, the situation is different again because the brake test is done in a different way by distance measurement while in Germany this is a deceleration rate of 3.5 m/s^2 for speed up to 25 km/h and 5 m/s^2 for speed up to 40 km/h.

This leads to a situation where Member States do not accept each other's testing results even when requirements are the same, of similar nature or even more demanding. The consequences are that manufacturers have to spend additional time and money to get approvals or certification in every other Member State they want to sell their product in.

Given that type approval and third-party testing is a national competency, Member States have established different types of authorisation procedures. These cover the submission of detailed technical documents describing the specifications of a machine or type of a machine and its design, testing results and the organisation and completion of tests involving third-parties either on the factory site or at the premises of the testing body.

Third-party testing first of all costs money - usually staff of testing facilities are paid by the hour. This makes third-party testing relatively costly for small machines of low value, e.g. gardening equipment and products with small series. But third-party testing also requires time. The direct staff

costs of the sector going into type approval are estimated to be at about **€ 3.7 m** in the EU. This represents almost **30 % of all direct staff costs**. As stated above, an average SME spends about € 30,000 on staff costs for third-party testing, while an average large provider spends about € 125,000 on the same activity. Having a six times higher turnover, the only four times higher costs for staff on third-party testing underlines the extra burden on SMEs.

The markets to be served follow very cyclical (construction) and seasonal (agriculture) purchase habits where many machines need to be ready for sale at a certain moment of time. Time delays can thus have a huge impact on the timely utilisation and hence the performance of the downstream industry.

Third-party testing and the factor 'time' - example provided by EU NRMM manufacturers

Respondents highlighted that engaging in national type approval and third-party testing processes involves a significant investment of time. One large firm for example invests about 25% of the time of 10 full time staff members (homologation professionals) in the process. A small firm that sells products to a much lower number of country markets mentioned a similar figure of 25% of full time hours, but this relates to the inputs of one homologation professional only. Large companies, in addition to the third-party testing, are able to conduct sufficient internal testing before going for the official tests. This is an extra cost and time item, but reduces the uncertainty of time delay and costs in case of failed test results. Small and medium-sized companies are not able to afford such extensive internal testing and are hence disadvantaged.

A further issue relates to the fees of national type approval and third-party testing bodies. It was noted that fees can be expensive ranging from tens of thousands of Euros invested annually by small firms to several hundred thousands of Euros by the very largest manufacturers.

The example of the Spanish decree provided by EU NRMM manufacturers

This is a paper work exercise and requires only a minor inspection of the product. For each product, the manufacturer or customer can pay € 900 for road registration but information to be collected includes drawings, bills of materials, wiring diagrams, brake tests etc. which can run into hundreds of pages and does not include any physical testing.

Total other costs for national type approval are estimated to be about **€ 75 m** across the EU. This represents **95 %** of all direct compliance costs for mobile machinery. In this category the stronger burden lies on the side of large manufacturers which spend on average € 2.8 m annually for third-party testing. On average they spend about € 400 per machine. SMEs spend on average much less for third-party testing. This can be explained by the higher burden for them to go through such a process and therefore reducing the number of third party test to be conducted where possible.

Commenting specifically on the issue of national type approval, both large and small manufacturers suggested that the process can be prohibitively expensive for certain product types. In some cases, given the high costs involved, the process can only be justified for products sold in high volumes.

Importance of volume - example provided by EU NRMM manufacturers

One small manufacturer mentioned that one of its products had slipped out of the threshold of high numbers

and while the product continues to be made available for sale it is not offered as a road approved version on some national markets. However, the same problem also occurs for large manufacturers where type approvals cannot be justified for some products sold in very small series. Consequently the issue of testing and road approval is moved downstream towards the dealers of machines.

In total, type approval is estimated to generate costs of about **€ 78 m** for the sector. This represents **1.2 % of** their **turnover** and **86 % of their total direct compliance costs**.

3.3.3 *Product design / development costs*

Product design and development is strongly affected by safety regulations particularly when requiring specific weight and size requirements such as dimensions, axle load etc. Such requirements can be of small or larger scale.

Examples of differences in dimensions between Member States provided by EU NRMM manufacturers

The following examples are indicative for the discrepancies between Members States, which cause a barrier to free circulation and create additional stock within companies:

1. Maximum permissible mass (2-axle machine): France: 19 ton – Germany 18 ton;
2. Maximum length of mobile machinery: Germany 12 meters length, 3 meters width – France 22 meters length, 4,5 meters width;
3.. Maximum axle load: France 13 ton – Germany 11.5 ton (Germany needs “light” version);
4. Maximum speed: France 25 km/h – Germany 40 km/h (other transmission, not easy for reconfiguration);
5. Italy: lighting and signaling specific;
6. Vehicles on rubber tracks: specific limits per country.

Given the divergent range of regulatory requirements at national level, product design and development and the manufacturing and integration of safety features need to be closely aligned with the relevant national rules on road safety. This requires intensive coordination within companies.

Design requirements affecting company organisation and coordination - example provided by EU NRMM manufacturers

The final design requirements defined by legislative requirements have to be assessed by homologation professionals and translated into manufacturing requirements for engineers. Therefore, some sort of ‘reverse engineering’ is needed within companies. Individual companies elaborated that for this step to be successful, a significant level of consideration and coordination is required between the homologation professionals familiar with the requirements, engineers responsible for developing compliant product designs and managing assembly lines, and production line technicians fitting the mobile machinery with different types of appropriate safety features.

Such coordination is time-intensive and leads to an estimated cost of staff of more than €1.8m for the sector. This reflects 15% of direct staff costs of compliance.

Engineering targeted at design - example provided by EU NRMM manufacturers

Companies indicate that extensive procedures are being set up to fulfil design requirements related to safety legislation. This is usually an integrated process in the general design development of a machine where both

the expected functionality of the machine and the legislative requirements need to be brought together. Examples show that individual engineers often spend almost 90 % of their time with design-related activities. Larger companies tend to spread these efforts across a series of engineers.

The exact way of dealing with diverging requirements depends on the individual business strategy. Some companies prefer to develop base models which then need to be adjusted according to the specific market. Others develop different machines for all markets.

Diverging design strategies – example of the base model provided by EU NRMM manufacturers

One option to cope with different requirements elaborated on in interviews is the possibility of using base models. To help manage the complexity of the process, some companies use a 'base product' that is initially designed and manufactured to a stage of development which makes it suitable for all Member State' markets. This base product is then tailored and adapted to meet the road safety requirements of the various country markets. In effect, multiple versions of the same product are produced to satisfy the needs of national regulations. This process is however repetitive and cumbersome.

The specific model chosen also depends on the type of machine and requirements. If the design requirements affect basic components of the machine, a base model approach is not helpful.

Requirements changing basic components – maximum speed limits - example provided by EU NRMM manufacturers

The example of the different maximum speed limit restrictions between the UK, France and Germany are resulting in necessary technical adaptations that need to be made to some models to ensure that the expectations of the relevant national authorities and consumer markets can be met. Such adaptations often have a strong impact on basic components of the machine and therefore do not allow for a base model approach. Machines then have to be built in different forms for different markets.

Not having a base machine, but being obliged to build different machines for a series of markets carries the risk of increased numbers of errors in production. Companies pointed out that it is very complex to guarantee the conformity of all machines in all markets if they differ in so many aspects.

In some cases, rules for design are purely based on safety necessities from previous years not taking into consideration technological progress. The design of machines may then be affected by outdated rules in legislation, where new technologies 'meet' requirements of former decades.

Outdated rules, example of France provided by EU NRMM manufacturers

The total weight of a machine with two axles is currently limited to 19t in France. This rule comes from a law of the 1950s, probably intending to keep bridges (etc.) safe. The solution in France was to have a third axle to meet the total weight limit which is currently limited at 26t. In Germany, for example, the total weight of a 2-axle machine may be up to 18t. However there are some exemptions where machines can go up to 22t depending on the region and the type of road on which a machine is driving. In Italy, the limit is 14t for a two axle machine, but there are exemptions also depending on the weight that are granted to drive on the road and the fee associated with it.

To fulfil French requirements, manufacturers install a third very small axle (see picture above) which is not in the way of the machine, but serves to fulfil the requirement. This 'add-on' does not provide any additional safety, but is necessary to get the machine approved for the road in France. Similar solutions are used to comply with German and UK road requirements.

The diversity of the rules and therefore design requirements, however, do not only create costs and hassle for manufacturers. They also represent a market entry barrier for small companies. While large companies, despite the indicated complexities, appear to be able to develop extensive long-term design and planning procedures, small and medium sized enterprises often focus their efforts on the main markets. This means that design costs created through non-harmonised requirements do not occur for small companies, as these are already hindering them from even starting to design machines for other markets. Such decisions are not only based on the efforts to design different machines, but also take into consideration the significant logistical efforts - particularly in terms of providing sufficient stocking space for a wide series of models.

The example of stocking provided by EU NRMM manufacturers

As some mobile machinery can have many variants/sub-options and built on a specific request from the customer/dealer, it is thus difficult to build a stock of machines in advance. During the busy time of the year (i.e. before the harvesting season), when all the machines need to be built, it is often difficult to provide the consumer/dealer with the machine on time. Building a machine in advance and then rebuilding it based on the consumer's specifications is very costly and time consuming.

In total, product design/development costs add up to an estimated **€ 2.4 m** for the sector. This represents about **3 % of direct compliance cost**. An average SME spends about € 30,000 on product design (more than 90% of it going into staff cost). Large manufacturers spend on average about twice as much for staff, but seven times more in terms of direct costs.

3.3.4 *Internal company product testing*

To increase certainty of compliance with safety regulation and to avoid having to repeat third party tests, companies set up their own internal product testing facilities. The internal testing process is embedded in broader manufacturing processes, ensuring that specifications are successfully met on an ongoing basis. This is complemented by set-piece tests at specific intervals with the assistance of specialised personnel, equipment and facilities, where companies have internal access to these.

Internal testing is cost-intensive and not possible for all SMEs. These often have to predict the outcome of the final third-party testing and therefore have a competitive disadvantage in comparison with large companies being able to install large scale testing facilities.

Internal testing facilities have first of all installation costs which represent a barrier for internal testing. They do however also generate constant staff cost of conducting such testing. In total, the costs for internal company product testing are estimated to represent about **€ 2.6 m** for the sector. This represents about **3 % of total direct compliance cost**. In terms of staff cost, they represent even **17 % of total staff cost**. Internal product testing/validation is however not solely a consequence of national road legislation requirements, but also required to meet basic consumer protection/product safety liabilities. Therefore, it is partially considered to be 'business as usual' costs. Internal testing amounts for an average SME to about €17,000 annually, mainly spent on staff. SMEs usually do not have the means to conduct large internal testing and therefore have to rely more strongly on third party tests. Large manufacturers, on the other hand, spend about €90,000 annually for internal testing (five times more than SMEs while having six times higher turnover), whereas about 16% of that is going into other costs than staff.

3.3.5 *Administration*

This compliance step is strongly linked to third-party testing and type approval body testing. In practice, it consists of a number of steps that need to be followed by manufacturers of mobile machinery. This includes the preparation and maintenance of technical files that highlight in a detailed way how the equipment technically complies with the regulations in order to support internal and external testing activities for national road safety regulations. Other information obligations also need to be considered, in particular the preparation and fixing of designated product markings that provide an immediate indication to users of the equipment that the necessary requirements have been met.

While the extent of the problem manifests itself to different extents in large companies and SMEs given the overall spread of Member States they respectively export to, the interview feedback suggests the burdensome nature of the problem for all sizes of companies.

Labour intensity - example provided by EU NRMM manufacturers

Companies usually have homologation professionals which spend extensive amounts of their time to maintain technical files. Even though not specific to NRMM manufacturers (as also required in the Machinery Directive), it is seen as a labour-intensive activity. Depending on the specific company structure this can be between 25 % and 50 % of their staff time. In terms of the issue of product markings, the amount of time spent on this aspect is comparatively lower.

Key complexity of the administrative requirements is the multiplication factor of the issue due to differences across Member States.

In total, administration adds to an estimated **€ 1.5 m** of total direct cost. This represents **1 % of** the **direct costs**. Most of the costs are however staff-related. It therefore represents with **€ 1.4 m** about **11 % of direct staff cost**. An average SME spends about € 14,000 annually on administration. In comparison, an average large manufacturer spends about € 48,000 (3.4 times higher than a SME, while six times higher turnover).

3.3.6 *Manufacturing of safety features*

Regulation for safety requirements also demands the manufacturing of specific safety features. The manufacturing of such features is less labour-intensive than other compliance steps, but creates a significant amount of fixed costs. In total, it corresponds to an estimated **€ 3.9 m** of total direct costs, whereas only 17 % of this amount consists of staff costs. It represents **4 % of total direct costs** (or 12% of staff costs). This implies that an average SME spends about € 16,000 on staff for manufacturing safety features and € 51,000 on other costs. In comparison, large companies spend about three times more on staff, but only 1.2 times more on other costs – again showing the advantage of scale for large manufacturers.

3.3.7 *Product markings and other information*

Product marking legislation is designed to guarantee the safety on the road. These cover for example signalling plates, information about speed limits etc. The challenge for manufacturers is to provide and add the right product markings for each machine for each market of homologation. The tasks for companies therefore include (amongst others):

- Developing and fixing product markings linked to Member State road safety requirements;
- Developing and fixing warning signs linked to Member State road safety requirements;
- Preparing and translating instructions linked to Member State road safety requirements.

Companies refer to the different markings not as a substantial cost factor in monetary terms, but nevertheless represent an administrative burden.

The example of differences in markings provided by EU NRMM manufacturers

There are differences in the speed marking stickers placed on the mobile machinery depending on the country. For example in Germany the maximum speed is 40 km/h, but in France it is limited to 25 km/ over 2.55 meters width. In addition, the layout of the sticker is also different (size and frame).

The manufacturer does not only have to purchase different stickers, but most importantly this difference in requirements causes higher administrative work related to limited transparency of the regulation being in place.

Additionally there are special marking requirements. For example, if no escort car is used, special markings on the machine are required in Germany (depending on the region). In France, anything beyond a 3.5 meters width requires an escort car.

Nevertheless they cause a certain amount of staff cost which can be estimated to be **5 % of all direct staff cost**. In total, this compliance step is estimated to cost manufacturers **€ 0.7 m**. An average SME spends about € 12,000 on product markings while an average large company spends about 1.6 times more. The majority of these costs are for both staff costs.

3.4 Indirect costs for industry and for others

As shown in the conceptual framework, costs of non-harmonised requirements for the road circulation of mobile machinery in the EU can be divided into **direct industry costs**, **indirect industry costs** and **indirect costs to others**. During the data collection exercise of this project, information was also collected from manufacturers on their indirect costs and the consequences for clients. Given the non-accounting style of occurrence of such costs and hence the very subjective understanding of how a counterfactual scenario would look like, manufacturers respond in a very scattered way in terms of quantification of the issue. Therefore, an extrapolation to the sector as a whole of these costs is not considered sufficiently reliable for reporting. It needs to be stated however that the qualitative elaboration on such costs strongly supports the importance of indirect costs for industry and their clients as well as road users.

Indirect industry costs are **costs not directly occurring in accounting format** within manufacturing companies, but **affecting the industry often in terms of opportunity costs** (= costs of a missed opportunity e.g. serving a respective market). Depending on the market power of a company, such costs **may be passed on to downstream clients**, either in total or in part. Indirect industry costs then cause consequences for clients of the industry either in terms of **delay**, **quality**, **price** or **accessibility** of products.

In addition to the indirect costs generated through the compliance activities of manufacturers, **further indirect costs are** being generated for other stakeholders. These are **administrative costs for MS governments**, **administrative burdens for dealers** (in case manufacturers are not implementing the homologation processes themselves) and the **risk of increased road accidents** due to substandard road safety requirements (in selected countries).

Indirect costs can therefore be grouped into four categories:

1. **Indirect industry costs**:
    a. Time delays in the introduction of new products;
    b. Reduced product innovation;
    c. Higher product prices;
    d. Squeezed profitability;
    e. Barriers to market entry (in particular for SMEs);
2. **Restricted choice by downstream clients and passed-on compliance costs**:
    a. Delayed and/or unpredictable delivery of machines;
    b. Existence of sub-optimal products;
    c. Different sale prices for the same or similar machines;
    d. Limited access to certain machines;
3. **Non-harmonised road safety requirements**:
    a. Transparency in regulation;
    b. Increased number of road accidents.
4. **Administrative costs to governments**
5. **Administrative burdens for dealers**

In the following a further in-depth elaboration on all above categories is presented.

3.4.1 *Indirect industry costs*

As stated above, indirect industry costs can be broken down into five categories of costs (which impact the competitiveness of the industry):

a) Time delays in the introduction of new products;
b) Reduced product innovation;
c) Higher product prices;
d) Squeezed profitability;
e) Barriers to market entry (especially for SMEs).

One key indirect industry cost emerging from direct costs relates to **time delays in the introduction of new products**. Delays to market result in costs around reduced sales efficiency and these impact negatively on the seasonality of agricultural and cyclical nature of construction mobile machinery markets. These delays also affect clients as they need to wait longer to receive their goods. In addition, time delays in the introduction of new products risk to lead to reduced product innovation. The feedback from manufacturers shows that the delays occur for two key reasons:

1) Smaller manufacturers point to the challenges related to meeting legal requirements generally speaking and countries that have type approval processes. The staff working on homologation are highly specialised and, given their limited resource capacity, smaller firms can only manage the process of meeting the requirements for a small number of national markets at the same time. In relation to this scenario, smaller manufacturers typically start with a major market (e.g. Germany, France of Italy – all of which are regarded as Member States with demanding requirements). Products are only rolled out to other countries at a later stage;
2) Where the use of a type approval or third party body is mandatory, such organisations may not be in a position to immediately subject vehicles to testing procedures. In addition, vehicles may need to be transported to other Member States and/or to designated testing sites as specified. Delays of up to several weeks or longer may emerge.

A further indirect industry cost due to roading approval and homologation costs lies in **reduced product innovation.** Investment in product innovations may be restricted due to differences in national regulatory requirements and the need to spend significant funds on compliance activities. Opportunity costs emerge as staff resources dedicated to homologation in various EU countries could be used in alternative ways to obtain a larger market share e.g. product innovation or managing the homologation requirements of third country export markets. As any change in design needs to be followed by a new or updated type approval, mobile machinery manufacturers tend to carefully consider – and sometimes delay – the introduction of a new product range. Often, they synchronise the launch of new models with the timing of new engine emission standards (Euro IV, V, VI). In addition, manufacturers complained that company finances are unnecessarily invested in national compliance activities, reducing the amount of funding available for product innovation.

Higher direct costs also further increase the general cost base of manufacturers which can lead to **higher product prices** for downstream clients. The ability to pass-on higher direct costs depends on the market power of the manufacturer in a national market. Increased barriers between markets raise the probability of having such a position. If not being able to pass on the costs, either **profitability will be squeezed** or if too high, certain products will not be produced/offered.

Another indirect cost for the industry are the **barriers to market entry** that arise as a result of the differences in national legislation. Barriers to market entry occur as a result of manufacturers' perceived difficulties of complying with the legislation of another Member State given that the

investment in dealing with new types of compliance requirements is greater that the 'willingness to pay' threshold. As a result, indirect costs emerge as a result of loss of market share (=opportunity costs).[43] Given that homologation is a specialised activity, some firms often **focus on ensuring compliance** with the legal requirements **in a small number of country markets** only. Given their scale, costs of this nature are more likely to be experienced by SMEs rather than large companies which often have the in-house technical capacity and resources to deal with differences in regulation between a larger number of countries.[44] Therefore, given their more limited sales volume, smaller manufacturers need to ascertain whether it is feasible to incur the costs associated with the compliance activities of entering the market in another Member State. In this case, although the costs of compliance are avoided, by choosing not to homologate their product range to the requirements of another Member State, indirect costs emerge given that smaller manufacturers lose market share in other EU markets.

While barriers to market are more associated with smaller manufacturers, larger firms noted issues around some specific types of products which are sold in very small series. In such cases, given the costs involved, particularly those associated with type approval procedures, it may not be worthwhile to invest in meeting the road approval requirements of another Member States.

Due to these barriers, manufacturers will carefully (re)consider their export markets based on their 'willingness to pay' the associated compliance costs on an ongoing basis. Smaller producers of agricultural machinery are known to restrict their sales to a limited number of countries only, as obtaining type approval in all EU markets is beyond the scope of their capacity and not justifiable in light of the small numbers of units sold. Smaller manufacturers also have major problems to comply with the administrative and linguistic requirements related to type approval.

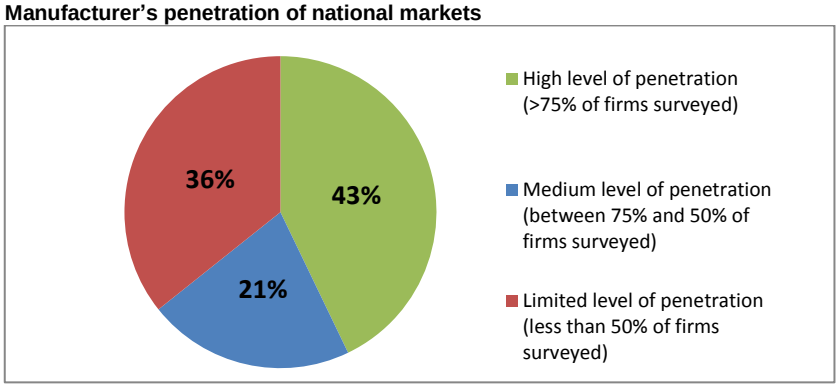
Traces of evidence of the above can be found in the results of the manufacturers' survey. Manufactures were asked to identify the markets in which they are active. This exercise aimed to define the MS markets for which a manufacturer considers obtaining roading approval a worthwhile exercise.

Only 12 EU MS markets (43% of the total number of MS) are accessed by more than 75% of the enterprises surveyed. In 6 national markets (21% of the total number of MS), between 50% and 75% of the manufacturers are represented, while in 10 EU MS (36% of the total number of MS), less than half of the EU manufactures supply their products (Figure 3.6).

[43] This opportunity cost can be important at a micro-level; however it may be offset by larger market shares of competitors, hence may be cancelled out at sector level. Nevertheless, it may also lead to reduced competition in some markets.

[44] Large firms are much more likely to experience a greater level of costs around direct compliance activities given the larger number of countries they operate within. SMEs are much more likely to focus on a smaller number of countries or just on their home country market.

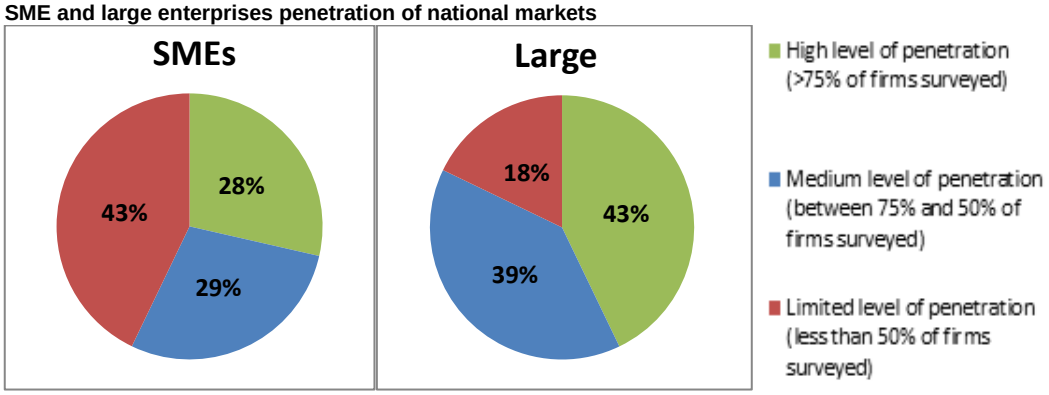
Figure 3.6 **Manufacturer's penetration of national markets**



Source: Ecorys based on Sector Survey 2015

Furthermore, these barriers to market entry seem to disproportionally affect SME manufacturers compared to large enterprises. There are 12 Member State markets where less than half of SMEs surveyed are present (43% of total number of MS). By the same token, there are only 5 Member States (18% of total number of MS) where less than half of the large enterprises surveyed are present. Along the same lines, there are 12 Member States (43% of MS) where a high number (>75%) of large enterprises is active, whilst there are only 8 Member States (28% of MS) where a similar share of SMEs surveyed is present.

Figure 3.7 **SME and large enterprises penetration of national markets**



Source: Ecorys based on Sector Survey 2015

The MS markets for each category can be seen in Annex III.7. Although a range of factors other than roading approval play a role in decisions to be active in particular Member States or not, there are certain challenges related for SMEs being active in only a limited number of markets. Smaller manufacturers can see their markets being increasingly constrained, which leads to reduced economies of scale. Recouping investments – in design, product renewal, homologation or type approval – thus becomes increasingly difficult as well. This can lead to a downward spiral, in cases where smaller producers see their market access shrink over time, which can ultimately lead to closure or reorientation to other markets. Indeed, the number of mobile machinery producers in the EU seems to have been reduced over the last three decades. Against, roading approval and homologation requirements are only one element in the overall business economics of such companies, however it is certainly an element which is not helping the industry in general and SMES in particular to be active across the EU.

Indirect costs also lead to further other types of opportunity costs which were identified as a result of the level of investment required in meeting the compliance requirements of EU Member State markets. In particular, this is related to the limited level of resources available to access new third

country markets (as a result of differences in third country legal requirements). Given the costs associated with homologation, opportunities outside the EU were regarded as not fully exploited.

3.4.2 Indirect costs to downstream clients

Indirect industry costs, depending on the capability of manufacturers to pass on the costs, cause further indirect costs to downstream clients. The main costs to downstream clients are:

1) Delayed and/or unpredictable delivery of machines;
2) Existence of sub-optimal products;
3) Different sale prices for the same or similar machines;
4) Limited access to certain machines.

The first issue caused through indirect industry costs is the issue of **delayed and/or unpredictable delivery of machines**. Due to the highly specialised and in some cases tailor-made aspects of the machinery, many manufacturers produce on-demand only. In the agricultural sector, this leads to strong cyclical peaks – e.g. orders are placed in winter and delivery is expected in the middle of the year, typically prior to harvesting. Clients are often requested to make down-payments and in advance of the receipt of their ordered products they prepare time specified plans for the use of their machinery. However, as mentioned already, roading approval requirements (whether type or single approval) can lead to delays in delivery – which can result in machinery not being in time for a particular construction project or the harvest, with production losses as a possible consequence.

Reduced product innovation due to direct compliance costs leads to the **existence of sub-optimal products.** Consequently, downstream clients cannot purchase the level of quality which would be possible in absence of this constraint. This reduces the productivity and safety of the users and as a consequence their competitiveness.

Based on the higher costs (and depending on the pass-on capabilities), downstream clients will need to purchase products for higher prices. In addition to the higher general prices, the barrier to market entry also introduces a **differentiation of sales prices** between Member States. After all, the different requirements, and the way in which manufacturers are positioned, leads to different costs and these would (if possible) typically be passed on to consumers. Manufacturers interviewed stated that that they are not always informed about final prices, which differ from factory prices not only because of sales margins and taxes but also due to seasonal changes, market situation and sales promotions of importers and dealers. For example, if braking requirements in Germany are higher (e.g. leading to the need to install high-power brakes), these costs will be passed on to German clients only. If a vehicle has been approved under a type approval procedure in one country and a single approval procedure in another country, the costs of compliance that will be passed-on to the different country consumers will differ.

A further reason behind different consumer prices for the same products is related to production and stock management issues. Whilst certain mobile machinery manufacturers are producing on demand only, others are producing in large series. This requires detailed production planning, and detailed forecasts about sales volumes for each product in each market. If these forecasts prove incorrect (which is not unusual), stocks of machinery for certain countries can pile up whilst there may be shortage of machines originally planned for export to other countries. This will require the manufacturer to either manage this stock (with capital costs incurred as a result) or reconfigure the machinery e.g. from a machine destined for the French market to one for the German market. Both options lead to higher costs and inflate production prices – which maybe passed-on to consumers.

Similar to the situation identified for mobile machinery, prior to the introduction of harmonised requirements for tractors (Regulation (EU) No 167/2013), significant price differences have been observed between EU MS in the period between 2005 and 2011. The 7th Framework Programme project *FACTOR MARKETS*[45] identified Germany as the market with the higher competition. Benchmarking prices in Germany with those in the Netherlands, the UK, Finland, France, Italy and Sweden for the same vehicle models, an estimated average of 10.3% price difference was identified with products being cheaper in Germany. Cross-border transport and red-tape costs were found to account for 4.4% of the price difference. The rest 5.9% was attributed to a combination of factors, most significant considered to be the market power of manufacturers and distributors in markets with a lack of competition, differences in demand, local distribution costs and to a lesser extend the impact of the market size on economies of scale.

Considering the similar nature to the mobile machinery sector, but accounting for the significantly smaller sector size, it can be reasonably assumed that intra-EU price differences for these mobile machines are at least equivalent to the one's previously found for tractors.

This differentiation in product specification and pricing also has a bearing on second hand market prices, as mobile machinery homologated in one country can be difficult to resell in another country. This leads to exceptionally strong price decreases for second-hand machines, especially so in smaller markets where a second-hand market for specialised pieces of machinery is sometimes non-existent given the high homologation costs. In some cases, this may prevent consumers from buying new equipment, as it would lead to too high depreciation.

A further indirect cost for clients, triggered by the above-mentioned indirect industry costs, is a **limited access to certain machines.** Anecdotal evidence collected suggests that this is not only the case in small markets (e.g. the Baltic States), but that this problem can also extend to larger countries, e.g. Spain or Italy which may be less interesting for a particular niche product. For example, it means that a beet or potato farmer in one country has access to the latest range of self-propelled harvesting machines, whilst his colleague from a neighbouring country does not have the option to purchase this product. This differentiated access to machinery can lead – ultimately – to differences in productivity of downstream producers across the EU. Phrased differently, a farmer in one country seeking for example an oilseed machine may be confronted with limited or no choice. Hence, this can lead to rent-seeking behaviour from monopolists or duopolists – which runs counter to consumer interests. In addition, it leads to an uneven playing field for companies competing with each other from different Member States and hence reflects a malfunctioning of the Single Market.

Another factor limiting the level of choice for clients relates to the availability of complementary products such as trailers. Consumers in some countries have requested manufacturers to produce bespoke trailers for certain mobile machinery given that alternative trailers are non-compliant with the national road safety requirements.

In addition to the indirect costs described, also the use of mobile machinery is reduced due to national requirements. For example for rural contractors or construction companies which offer these services in different Member States, the **use of mobile machinery in a cross-border context is not always possible**, resulting in further costs being incurred by them. Feedback from stakeholders indicates that in some cases there have been difficulties for construction service

[45] Jorgensen, C., Persson, M., The Market for Tractors in the EU; Price Differences and Convergence, Comparative Analysis of Factor Markets for Agriculture across the Member States, 2013

providers to take mobile machinery across borders for projects in other Member States as a result in differences in the national road safety requirements. The outcome is that it is sometimes more cost effective for service providers to hire compliant mobile machinery in the relevant country where the project is taking place.

3.4.3 Non-harmonised road safety requirements

The overall problem of non-harmonised requirements for the road circulation can also lead to insufficient road safety requirements in certain countries in comparison to high-requirements in others. Industry representatives interviewed point in this context to limited **transparency in regulation**. It leads to potential road safety risks, although statistics on road accidents are not sufficiently detailed to link these precisely to mobile machinery.

Non-harmonised road safety requirements also contain the risk to increase the **number of road accidents** involving mobile machinery. While the technical quality of the national legislation has not been examined by this study, feedback from stakeholders suggests that the different national legal frameworks result in differences in the level of road safety between Member States. The underlying reasons are twofold:

- Although it is not possible to prove this point with the use of statistical data, feedback from interviewees suggests that the risk of harmful accidents is greater in some countries as some safety requirements used in other countries are not in place. As a result, certain users may be at greater risk of accidents and where they occur a wide series of costs would likely be incurred (e.g. loss of productivity, statutory employee absence from work payments, personnel injury claims, higher insurance costs, reputational damage etc.);
- Manufacturers may not be prepared to sell their equipment based on what they see as lower safety standards to other Member State markets for fear of accidents occurring and therefore the products exported go beyond the minimum national requirements. From a regulatory perspective, this provides a competitive advantage to producers located in the relevant Member State (with insufficient market surveillance) and manufacturers based in third countries exporting to the same market that may only be prepared to meet the national minimum requirements.

Building on this issue, and taking into consideration a general increasing trend towards more safety requirements, national authorities are expected to further strengthen their national road safety requirements over time.

3.4.4 Administrative costs for governments

In addition to the costs to industry, their downstream clients and road users, national authorities are also affected by road approval procedure costs. This can simply be shown as all official processes can be mirrored from the efforts of the manufacturers to the authorities. Their efforts consist of two key activities:

- Updating and enforcing legislative requirements;
- Conducting inspections and third-party testing.

In the case of harmonised requirements, the administrative costs for governments would also drastically decrease. The aspect of updating legislative requirements would be reduced to one set of requirements (reducing the multiplication of up to 28 different sets of requirements to be updated). The enforcing of requirements would remain in place, but reduced by the multi-homologations of machines in different Member States (as one homologation process would be

enough). Instead of conducting the approval procedures independently, they would rely on either an EU body or the procedures of other Member States. The aspect of third-party testing would be similarly reduced by the number of double/triple tested machines.

3.4.5 Administrative burdens for dealers

The administrative burdens for dealers have not been subject of this study. However, dealers are an important player in the mobile machinery business, especially so in smaller countries where they are often taking the lead in processing road approval procedures, often through single approval procedures.

From a macro-perspective, costs and burdens for dealers are partially similar to those for companies and partially similar to those for consumers.

3.5 Conclusion and outlook

The overall problem of having non-harmonised requirements for the road circulation of mobile machinery in the EU consists of three specific issues:

- *Road approval procedure costs* cause direct (administrative burdens for manufacturers and regulatory charges) and indirect costs to industry (time delays in the introduction of new products, reduced product innovation etc.) as well as indirect costs to others (administrative costs for MS governments, administrative burdens for dealers, time delay in delivery etc.);
- *Compliance costs related to non-harmonised requirements* are causing direct industry costs (additional logistics, administrative translation, additional manufacturing & design costs) which cause indirect industry costs (higher product prices, barriers to market entry etc.). Based on the market power of the industry such costs may be further passed-on to downstream clients (in the form of increased prices or different prices across Member States, differentiated access to machines);
- *Substandard road safety requirements* can be caused in some Member States due to a lack of common EU minimum requirements, which might cause an increased number of road accidents involving mobile machinery.

Most demanding Member States are Germany, Italy and France (which are also the main producers of mobile machinery). Other Member States still have comparatively low requirements. Industry expects them however to raise their requirements substantially within the next decade. An assessment of the types of requirements shows that vehicle performance and control as well as vehicle dimensions are the main categories generating difficulties for industry. Diverging and rigid braking requirements are seen as a particular issue.

Direct costs for the industry to comply with existing legislation add up to € 90 m in the EU. This corresponds to 1.3% of their turnover[46]. The costs occur across seven key compliance activities:

1) Staff familiarisation with the legislation;
2) Type approval body testing / third-party testing;
3) Product design / development costs;
4) Internal company product testing;
5) Administration;

[46] It needs to be noted that not all such costs would disappear if harmonization was achieved. Even in the case of complete absence of any kind of legislation, industry would still invest in safety to fulfil the needs of their clients

6) Manufacturing of safety features;
7) Product markings and other information.

The largest costs relate to type approval and third-party testing (86% of total costs and 29% of staff costs[47]). All other activities are mainly staff intensive. The highest staff costs occur in internal testing (17% of staff costs), product design (15% of staff costs).

The importance of direct costs due to non-harmonisation increases with the number of markets served and is therefore becoming increasingly visible for large manufacturers aiming at serving the whole EU.

Of the above-mentioned € 90m direct costs, **€ 57 m of them can be described as excess cost** (costs that are additional burden to what would have occurred also without the existence of requirements). This corresponds to **0.8 % of the industries turnover**.

Additional **Indirect industry costs** contain time delays for the introduction of new products, reduced product innovation, higher product prices, barriers to market entry and squeezed profitability of the sector – all of them being indicators of relevance to competitiveness of the sector). Depending on the market power of the industry, these costs are carried by manufacturers themselves or passed on to their downstream clients. For example, time delays in delivery tend to cause challenges for downstream clients. Their productivity is hampered through the extended use of sub-optimal products, their level playing field is uneven due to increased or differentiated costs of machines and they may have access to only a limited number of machines.

All these factors have a **negative impact on the overall sector competitiveness** and the competitiveness of its downstream clients.

The concepts of competitiveness, productivity and trade performance

The concept of competitiveness can be seen from two angles: productivity and trade performance.

- **Productivity**: One angle concerns the average level of firms' productivity. According to this line of reasoning, competitiveness is a desirable objective *per se*, to the extent that an improvement results in a more efficient use of the input factors and thus in a higher level of aggregate welfare of society. Productivity gains are also a desirable target given the strong consensus in economic literature in identifying it as the principal driver of economic growth in the medium to long term. In this logic, competition can foster competitiveness – as it allows more productive and performing companies to gain over less productive one's. Removing barriers to entry in a given market is expected to generate positive productivity dynamics as it provides an incentive to incumbents to innovate and raise productivity.
- **Trade performance**: Another angle to competitiveness lies in trade performance; competitiveness is not a target *per se* but rather should be seen as an indicator of firms' ability to face global competition. Competitiveness in terms of trade performance is especially relevant whenever the competition comes from extra-EU global players. A more competitive European industry would be able to sustain the challenges posed by increasing trade and acquire bigger shares of the global market. In this line of reasoning, it becomes crucial to consider not only the level of competitiveness of mobile machinery manufacturers but also that of the final users of mobile machinery products, namely

[47] Costs can be further distinguished between staff and direct costs. Staff costs are costs occurring through the payment of a salary to staff. Direct costs are for example costs to get a certain document approved or to by tools etc.

construction and agricultural industries, which do compete on a global level too.

Competitiveness will be hereby characterised as a combination of these two angles.

The current situation poses constraints on the **overall competitiveness** of the sector essentially in three forms. Firstly, the presence of national regulatory schemes and approval procedures results in a **smaller and fragmented markets** for mobile machinery manufacturers. The presence along national borders of significant **barriers to entry** prevent firms from exploiting potentially beneficial economies of scale and constitutes a bottleneck for any virtuous process of specialization among mobile machinery producers. This market situation impacts especially the **competitiveness of SMEs** which are confronted with challenging requirements when pursuing new markets. This may result in SMES remaining confined to their domestic MS markets. As pointed out in the above box, limited entry of new competitors on national markets may reduce the competitiveness of the EU mobile machinery industry as a whole, as it loses out on opportunities to raise productivity and to export.

A second line of reasoning is that competitiveness levels are comprised by the **resources to be allocated to the compliance** with non-harmonised standards, leading to higher production costs, hence shrinking profit margins or raising product prices. Unlocking these resources would for example allow a reduction of prices, a one-off positive improvement in the level of competitiveness of both mobile machinery producers as well as downstream sectors. Alternatively, the same resources could be reverted to investments in research and innovation, which would generate a virtuous longer term dynamic of improving competitiveness among mobile machinery producers.

The third constraint on competitiveness relates to some of the indirect costs for the industry and for other stakeholders mentioned in the previous sections, such as the existence of suboptimal products or the time delays in the introduction of new products and in the delivery to buyers. These aspects may not be directly related to the productivity levels of the mobile machinery industry, but they do have a bearing on the **competitiveness of downstream sectors** which rely on the supply of mobile machinery products. Along this line of reasoning, the competitiveness of downstream industries is affected by inefficiencies currently present in the mobile machinery sector.

In addition to the impacts on competitiveness of the industry and costs carried by downstream clients, administrative costs are also incurred by Member State governments, dealers and road users – through a higher number of road accidents particularly in Member States where substandard road safety requirements exist.

This above situation is not expected to be stable, and the **outlook points to a further increase in costs over time**. Three trends are driving such cost increases: a future expansion of the EU as well as the general trend in all societies to increase regulations as well as enforcement regarding safety aspects. The current situation is driven above all by the second trend, as many newly accessed MSs face a safety problem and are under mounting public and/or political pressure to introduce the necessary provisions to guarantee safety on the road. This would lead to a further increase in national requirements over time. A third trend is the expected increase in the enforcement of existing requirements by MS governments. Consequently, a further fragmentation of markets can be expected. Even if new Member States choose similar requirements as others, they may stick to individual third party tests and further requirements which will multiply the road approval processes. This means that further staff will need to be hired to serve certain markets, translations will need to be made, familiarisation with new requirements will be necessary etc.

Hence, based on the manufacturers survey, **excess costs for direct compliance are expected to increase by about 33 % to € 76 m in the next 10 years.** Given the stable market size (see chapter 2) this will mean a significant increase in pressures on the industry, including its competitiveness and profitability.

Quantification of baseline

The baseline scenario which assumes no EU intervention is the extrapolation of the current situation towards the future. The time frame chosen was the period 2015-2025. In the survey companies were asked what they think would happen to the current direct and indirect cost in case of no EU intervention. The percentage expectation was then used to extrapolate the individual company costs towards the future. Aggregating these numbers and extrapolating from the survey sample to the overall population was done the same way as for the current direct cost.

The main reason provided by respondents for an expected increase in costs without EU intervention is that particularly the New Member States are expected to increase their requirements.

Further explanation on the methodology for quantifying the baseline scenario is provided in annex III.

In addition, indirect costs are expected to further increase by up to 20 %. This is based on the same assumption that markets will be more difficult to be served. Thus, particularly small manufacturers will not be willing to enter specific markets anymore. Consequently, downstream clients will have less choice or different choice depending on their location in the EU. This creates an uneven playing field amongst them.

To sum up, without EU intervention, requirements will continue to be formulated at national (and increasingly regional) level - with only minor coordination between and mutual recognition of requirements in other Member States, thus leading to ever widening differentiation in road circulation requirements for mobile machinery across the EU. Without EU intervention, the prospect of a functioning internal market for mobile machinery will remain a *mirage*.

4 Objectives and policy options

Building on the market assessment of mobile machinery and the problem analysis of the non-harmonisation of road approval requirements, this chapter elaborates on the objectives for the EU which can be derived thereon. Building on the objectives, the different policy options are outlined to achieve the objectives.

4.1 Objectives

The general objective for developing policy options is to improve the functioning of the internal market in the EU by countering the general problem of non-harmonised requirements for the road circulation of mobile machinery. This objective can be reached by increased product innovation, reduced market prices, increased export ability within the EU and outside the EU, increased profitability and increased diversity of products on national markets. Therefore, the following three sub-objectives need to be addressed:

1. Decrease roading approval and certification costs for industry;
2. Decrease compliance costs related to non-harmonised requirements;
3. Guarantee high standard road safety requirements across the EU.

Ad 1) Decrease roading approval and certification costs for industry and Member States

Decreasing roading approval and certification costs for industry would consequently lead to decreasing regulatory charges which serve the objective of increasing product innovation, having more resources available. Moreover costs associated with time delays in taking a product to the market can be decreased leading to lower intermediate prices. Lower intermediate prices lead to lower market prices, increased export ability within the EU and outside the EU and also increase profitability of the industry. Moreover, administrative costs for Member States governments or third parties can be reduced by accepting each other's or one common approval procedure. All these factors lead to an improvement of the functioning of the internal market.

Ad 2) Decrease compliance costs related to non-harmonised requirements

Decreasing compliance costs by reducing additional manufacturing and design costs, reducing additional logistics, administrative, translation and consulting costs, increasing the transparency of regulation in Member States and reducing the costs associated with time delays in taking a product to market reduces intermediate prices and hence reduces consumer prices, increases export ability within and outside the EU and increases profitability which increases the functioning of the internal market.

Furthermore, decreased compliance costs reduce market entry barriers for SMEs particularly in small (and hence less profitable) markets to guarantee the same access to goods for all clients in the internal market.

Ad 3) Guarantee high standard road safety requirements across the EU

The objective of guaranteeing a high standard of road safety across the EU is a side-objective not leading directly to an improved functioning of the internal market. However, tackling the issues above to increase harmonisation of requirements for road circulation of mobile machinery to address the malfunctioning of the internal market also creates an opportunity to harmonised safety

requirements in such a way and at such a level that it effectively enhances safety and thus leads to a decreased number of road accidents involving mobile machinery.

4.2 Policy options

The policy options to be elaborated need to be in line with the objectives and hence tackle the underlying problem. The NLF (New Legal Framework) has been taken as a starting point for building these policy options.

Two dimensions of the relevant options have been considered when building the options:

1. The comprehensiveness of the legislation, i.e. does the regulation apply to:
    a. Systems; or
    b. System components.
2. How is the process of managing certifications dealt with:
    a. National authorities certification or 3rd party certification;
    b. Self-certification;
    c. Part self-certification and part 3rd party certificate for safety critical components.

According to these dimensions, a baseline scenario "Do nothing option" and four distinct policy options can be defined, producing every possible combination of the two dimensions described above:

The time horizon for all options is 10 years (until 2025).

Policy Option 0: Do nothing option

This policy option is forward-looking and seeks to understand what would happen if no EU-wide action is taken. It implies that Member States would still have powers to set their own national road safety legislation for mobile machinery. No action will be taken by the European Commission under this scenario. For this option it is important to stress that even if requirements are classified as not demanding, the NRMM manufacturers' overall workload related to necessity of having an up-to-date overview of requirements and correctly applying them in each MS is very high and is expected to further rise in the future. Only in direct compliance cost the increase is expected to be 33 % and lead to a total of € 76 m excess compliance costs. Especially the requirements in new MSs are expected to rise in the future. Not only evolution in regulatory requirements but also changes in enforcement need to be taken into account. There were two trends adding up to strong growth of non-harmonization costs, the expansion of the EU and the general trend in all societies to increase safety aspects. The current situation is driven above all by the second trend, many newly accessed MSs face a safety problem and have to introduce the necessary provisions to guarantee safety on the road.

Policy Option 1: Mutual recognition regulation for self-propelled and towed mobile machinery

Under this scenario, mobile machinery manufactured according to equivalent national rules of one Member State should be recognised as compliant by authorities in other Member States.

Policy Option 2: Introduction of 'harmonised legislation for systems/components/separate technical units related to the road circulation of self-propelled and towed mobile machinery

Under this option, the overall approval of the whole vehicle would remain at national level. However, approval of systems/ components/ technical unit regulations would be harmonised at EU-level. For some of the components, certification exists already in other sectors. For the remaining aspects, harmonised regulations will need to be defined. This policy option would be established under the European Commission's New Legislative Framework (as is the case with the Machinery Directive).

In addition, the harmonised regulation for the approval of systems/ components/ technical unit should be established on the basis of three alternative sub-options in dependency of safety relevance ('self-certification', 'part self-certification and part third party certification for safety critical components', and 'complete third party certification'. through notified bodies.

Table 4.1 **Policy Option 2**

Policy Option	Sub Option
Harmonised legislation for systems/components/separate technical units for mobile machinery related to road circulation	Self-certification
	Part self-certification and part third party certification for safety critical components (the safety critical components need to be defined in the options)
	Complete third party certification

Policy Option 3: Harmonised legislation for the whole approval of self-propelled and towed mobile machinery (including all separate technical units) related to road circulation

This policy option would be established under the European Commission's New Legislative Framework (as is the case with the Machinery Directive). According to the three sub-options below, the approval of the whole vehicle would occur through either 'self-certification' or 'part self-certification and part third party certification for safety critical components' or 'complete third party certification'.

Table 4.2 **Policy Option 3**

Policy Option	Sub Option
Harmonised legislation for the whole approval of self-propelled and towed mobile machinery (including all separate technical units) related to road circulation'.	Self-certification
	Part self-certification and part third party certification for safety critical components (the safety critical components need to be defined in the options)
	Complete third party certification

Policy Option 4: EU type approval of self-propelled and towed mobile machinery

Under this option, type approval bodies would approve either components or the whole vehicle. The legislation could operate in a similar way as the type approval of agricultural tractors currently. Given that this scenario could not be established under the New Legislative Framework, self-certification would not be available. The two sub options relate to either EU separate system and component type approval or EU whole vehicle type approval. The two sub options do not necessary exclude each other and may also be implemented both.

Table 4.3 **Policy Option 4**

Policy Option	Sub Option
EU type approval	EU separate system and component type approval
	EU whole vehicle type approval

4.3 Conclusions on objectives and policy options

Harmonisation of the requirements for the road circulation of mobile machinery would not only reduce costs to manufacturers, authorities, clients and other related stakeholders and create a level-playing field for all, but also provide a consistent high level of safety on the road for mobile machinery across the EU. EU intervention therefore needs to define policy options which achieve:

- a decrease of roading approval and certification costs for industry;
- a decrease of compliance costs related to non-harmonised requirements;
- guarantee high standard road safety requirements across the EU.

Four policy options consisting of ten sub-options were defined as possible answers to achieve the objectives defined based on the problem analysis. These range from no EU intervention, to mutual recognition, partial interventions of harmonising parts, harmonising legislation and to the introduction of an EU type approval. In the following chapter the impacts of each of the policy options on the sector will be assessed.

5 Assessment of impacts

In this chapter the impacts of the policy options 1 – 4 are assessed in comparison to policy option 0 (= do nothing). This means that the assessment compares how the situation would be for the sector in the year 2025 under the respective policy option in comparison to the trends outlined in chapter 3.5 (= policy option 0: Do nothing). The assessment of impacts focuses on the economic impacts, but also includes social and environmental impacts. Before assessing the impacts of each policy option, all potential impacts need to be identified and their significance assessed.

5.1 Identification of potential and significant impacts

Based on the EC Better Regulation "Toolbox", before assessing the significant impacts of each policy option a first screening of potential impacts needs to be done. The following table provides an overview of impacts of policy options.

Table 5.1 Overview of potential impacts of policy options

Impact	Impacts
Economic	- Increase/decrease of direct costs for industry - Increase/decrease of indirect costs for industry - Increase/decrease of costs for downstream clients - Change of level playing field of downstream clients - Increase/decrease costs for other stakeholders - Increase/decrease of competitiveness - Improved/Harmed growth potential for SMEs - Improvement/Harm of Single Market - Improved/Harmed innovation activities - Improved/Harmed technological development - Improved/Harmed competition - (Un-)fairer competition - Increased/decreased extra-EU trade - Increased/decreased inner EU trade - Increased/decreased potential for standard setting for outside EU - Improved/Harmed cost structure of the industry - Increased/Decreased consumer prices - Improved/Reduced focus on productive activities - Increased/Decreased costs for authorities
Social	- Increase/decrease of jobs - Increase/decrease of salaries - Increase/decrease of health & safety of users and citizens - Improved/Decreased burden for administration - Increased/Decreased regulatory based moving of plants (certificates shopping)
Environmental	- Reduced/Increased dimension impact on roads - Reduced/Increased waste of machines (re-use of machines)

Not all potential impacts listed are expected to be significant. The following table provides a qualitative assessment of which impacts are expected to be significant, potentially significant or not

significant at all and links each type of impact to the elements of the problem tree effected by the policy options.

Table 5.2 Assessment of significance of potential impacts of policy options

Impact	Impacts	Significant[48]	Due to policy option effects on
Economic	Increase/decrease of direct costs for industry	yes	- Administrative burdens to manufacturers - Regulatory charges - Hassle costs for manufacturers - Compliance costs for manufacturers
	Increase/decrease of indirect costs for industry	yes	- Time delays for introduction of new products - Product innovation - Production prices of NRMM - Barriers to market entry - Profitability of manufacturers
	Increase/decrease of costs for downstream clients	yes	- Differentiated NRMM costs per MS market - Administrative burden to dealers
	Change of level playing field of downstream clients	yes	- Differentiated NRMM costs per MS market - Differentiated access to NRMM per MS market
	Increase/decrease costs for other stakeholders	yes	- Administrative costs for MS governments
	Increase/decrease of competitiveness	potentially	- Product innovation - Time delay to delivery of NRMM - Existence of sub-optimal products - Production prices of NRMM - Differentiated access to NRMM
	Improved/Harmed growth potential for SMEs	potentially	- Barriers to market entry - Product innovation - Profitability of manufacturers
	Improvement/Harm of Single Market	yes	- Differentiated costs of NRMMs - Differentiated access to NRMM
	Improved/Harmed innovation activities	potentially	- Time delay for introduction of new products - Regulatory charges
	Improved/Harmed technological development	potentially	- Product innovation
	Improved/Harmed competition	potentially	- Differentiated costs of NRMMs - Differentiated access to NRMM

[48] in terms of absolute magnitude or relative to stakeholders

	(Un-)fairer competition	potentially	- Differentiated costs of NRMMs - Differentiated access to NRMM
	Increased/decreased inner EU trade	Yes	- Barriers to market entry
	Increased extra-EU trade	Potentially	- Product innovation
	Increased/decreased potential for standard setting for outside EU	No	n/a
	Improved/Harmed cost structure of the industry	Yes	- Administrative burdens to manufacturers - Regulatory charges - Hassle costs for manufacturers - Compliance costs for manufacturers
	Increased/Decreased consumer prices	Potentially	- Differentiated NRMM costs per MS market - Administrative burden to dealers
	Improved/Reduced focus on productive activities	Yes	- Administrative burden to manufacturers - Administrative burden to dealers - Hassle costs for manufacturers - Compliance costs for manufacturers
	Increased/Decreased costs for authorities	Yes	- Administrative costs for MS governments
Social	Increase/decrease of jobs	Yes	- Sub-optimal products - Time delay to delivery - Barriers to market entry
	Increase/decrease of salaries	No	n/a
	Increase/decrease of health & safety of users and citizens	Potentially	- Number of road accidents
	Increased/Decreased burden for administration	Yes	- Administrative costs for MS governments
	Increased/Decreased regulatory based moving of plants (certificates shopping)	Yes	- Barriers to market entry
Environmental	Reduced/Increased dimension impact on roads	No	n/a
	Reduced/Increased waste of machines (re-use of machines)	No	n/a

According to the Better Regulation Guidelines only significant impacts need to be assessed. This definition can be extended to potentially significant impacts. As shown most significant or potentially significant impacts can be observed in the categories of economic impacts followed by a few substantial impacts in the area of social impacts. Environmental impacts are mainly seen as not significant. This is no surprise given that most environmental aspects of mobile machinery are already harmonised. The strongest effects felt by the problem of non-harmonisation are seen to be of economic nature (higher costs and market barriers hampering competitiveness) which have

consequences on social impacts (such as jobs). In the following sections the impacts of each policy option in relation to policy option 0 will be assessed.

5.2 Assessment of specific impacts of policy options

In this section the impacts of policy options 1 – 4 are assessed in relation to policy option 0 'Do nothing' (detailed quantitative assessments of policy options are provided in ANNEX III.6). The focus lies on those impacts defined as 'significant' in the section above. Where the impacts were classified as 'potentially significant' they are assessed and listed in case of significance. Other impacts may be mentioned where a risk remains. Each of the sections starts with an overview table outlining the key impacts, followed by a further detailed description.

Assessment of policy options and quantification of the impact

Policy options are assessed in comparison to policy option 0 'do nothing'. Where possible this impact is being quantified. Such a quantification is mainly possible for direct compliance cost for industry. The process consists of the following steps:

1. **Assessment of individual direct cost development**: this step is based on data gathered by company through the survey. Respondents were asked to which extent (in %) a certain policy option would impact their direct and indirect costs looking at a time frame of 10 years (for the year 2025). Based on the answers a company individual estimate for the cost development for each policy option was made;
2. **Extrapolation of cost assessment**: the assessment of individual direct cost developments provides an individual company outlook on costs based on all policy options. The estimates were then aggregated and extrapolated to the whole sector in the same way as the current costs and the baseline;
3. **Assess overall impact**: the overall impact of a policy option is to be assessed in comparison to policy option 0. Therefore policy option 0 is deducted from the estimate for a given policy option. The outcome shows the positive or negative cost development of a certain option.

For other impacts where a quantitative assessment of the impacts is not possible a qualitative assessment is provided describing the impacts based on stakeholder interviews, the survey and expert judgment.

5.2.1 Impacts of policy option 1: Mutual recognition

Table 5.3 Overview of key economic, social and environmental impacts of policy option 1: Mutual recognition

Impact	Positive impact	Negative impact
Economic	- direct compliance costs: **- € 4 m** - possibility to use staff for more productive tasks can lead to an increase in innovation - possibly increased trade flows due to abolishment of barriers to market entry. Reduced costs and market fragmentation can boost product innovation especially for SMEs - increase in industry competitiveness, - potentially decreased consumer prices	- continuing costs of **proving technical equivalence** of requirements

	- reduced administrative burden for public authorities	
Social	- potential increase in staffing in authorities if introducing similar testing bodies in MS where they do not exist yet - **potential (but unlikely) incentive to improve safety requirements in MS where there are lower requirements** (to achieve MR) causing health improvements (reduced risk of accidents)	- risk of companies moving to MS with more "loose" requirements/controls: **"shopping" certificates** at preferred authorities - potential employment reduction in companies
Environmental	- more harmonised weight and dimension impacts	- due to risk of "shopping" certificates that machines fulfil lower requirements based on choosing easy approval

"Mutual recognition ensures market access for products that are not subject to EU harmonisation. It guarantees that any product lawfully sold in one EU country can be sold in another. This is possible even if the product does not fully comply with the technical rules of the other country"[49]. Consequently, mutual recognition is already in place and therefore has an overlap with policy option 0. When assessing the impacts of this policy option, feedback from stakeholders underlines however the **non-functioning of mutual recognition for the sector**. This is due to the strong diversity of goods under observation, protective behaviour of Member States and the strong burden of proof with respect to the demonstration of technical equivalence.

Assuming the functioning of mutual recognition, it would however have beneficial impacts. The main positive impacts of mutual recognition are of an economic nature. From the economic perspective it can be expected that mutual recognition would lead to **slightly decreasing direct costs for manufacturers**. This would however happen without a "capping" of the costs at a certain level as the issue of proof of equivalence of requirements remains under mutual recognition. These need to be however treated with care as they were estimated under the hypothetical scenario that this policy option would "work". The **reduction of administration costs and market barriers for manufacturers** leads to an **increase in the competitiveness** of the sector **and especially of SMEs**. Moreover, SMEs (as well as large enterprises) will benefit from the reduction of the barriers to market entry, since NRMM will be accepted in all MS after having been approved in one MS. The reduction of these barriers will lead to increased intra-EU trade flows. Also, this option entails a **reduction of time delays** to get products to markets, **contributing to product innovation**, thus further improving the competitiveness of the sector.

Reduction in administration costs for manufacturers and dealers can potentially be passed on as a **price reduction to users**. Accounting also for the increased product innovation and the reduction of market fragmentation we can assume an **increased competitiveness for downstream sectors**,

However, the main negative expected impact of full implementation lies in the risk that companies start **"certificates" shopping**. Consequently, Member States with stricter requirements would be even more hesitant to accept mutual recognition which further increases the burden of proof of technical equivalence and hence reduces the functioning of mutual recognition.

[49] http://ec.europa.eu/growth/single-market/goods/free-movement-sectors/mutual-recognition/index_en.htm

The social aspects of mutual recognition are rather limited and if so, mainly related to employment aspects and safety. There are potentials for more efficient use of staff at the side of manufacturers if the burden of different homologation processes would be reduced. Mutual recognition requires however that trust exists in the requirements of other Member States, and that there is some conversion rather than divergence between Member States. However, in case of high and structural burden of proof of technical equivalence, manufacturers would shift the focus of the same or similar staff simply on the task of proofing such equivalence. Additionally, companies may try to find it easier to obtain approval in other Member States and therefore decrease the overall safety requirements in now stricter Member States. On the other hand, to guarantee acceptance of its own requirements in other Member States, particularly New Member States may have an incentive to increase their requirements.

From an environmental perspective, mutual recognition is not expected to have any significant impacts. There may be a risk of reduced overall requirements, due to "certificate shopping". Environmental aspects not yet regulated are however limited.

To sum up, the policy option in itself appears to be attractive as it would not require harmonisation agreements at an EU level. The problem remains however that Member States are very protective of their systems and appear to lack trust in the requirements of other Member States. This reduces the feasibility of actual mutual recognition and hence is not expected to achieve the potential gains. Furthermore, this policy option would not solve the problem in the long run as new machines or requirements will necessitate to restart the process of proving technical equivalence.

5.2.2 Impacts of policy option 2: Harmonised legislation for systems and components

Table 5.4 Overview of key economic, social and environmental impacts of policy option 2: Harmonised legislation for systems and components

Impact	Positive impact	Negative impact
Economic	- decreased direct costs for homologating spare parts - reduced need for duplication and easier exportability resulting **in increased trade flows** - **improved access to second hand markets** and selling/purchasing of spare parts for NRMM users common market especially for niche SMEs boosts product innovation - increased NRMM sector and downstream sector's competiveness - potentially ending the trend towards even more diversification at least at the level of components	- increase of direct costs of compliance: **PO 2.1: +€ 0.88 m;** **PO 2.2: +€ 10.2 m;** **PO 2.3: + € 13.3 m** - risk of double testing: parts and complete machines
Social	- **improved coherence of key parts** relevant for safety, hence creating more coherent and probably high safety requirements across the EU - potential reduction of accidents due to improved key components in Member States with currently low requirements	- in case of self-certification a reduction of staff in third-party testing bodies may be needed. - increased staff needs for internal testing in case of self-certification.
Environmental	- more coherence in parts increasing predictability of impacts - **increased possibility for "re-using"**	

Impact	Positive impact	Negative impact
	components in other Member States and hence reduction of waste	

Under this option, the overall approval of the whole vehicle would remain at national level. However, approval of systems/ components/ technical unit regulations would be harmonised at EU-level. The policy option of harmonising the main systems and components is described by main industry stakeholders as a way forward, but not as a full solution to the problem. Industry sees it as a step that would bring the sector closer to the targeted harmonisation, which has as an advantage a high degree of feasibility. It is expected that this option could be implemented quicker than full harmonisation – which gives it some attractiveness.

On the positive side, this policy option has the **potential of decreasing or at least capping some costs**. Even though direct manufacturer costs are expected to increase (at least slightly under Policy option 2.1), a certain harmonisation of parts is expected to guarantee long term gains and facilitation. It further reduces diversification due to legal differences and thus supports the development of the best possible components across the EU **boosting product innovation**. Moreover, spare parts can be easier reused as they are already homologated according to EU legislation. This option will lead to **increased intra-EU trade flows** of both new and second-hand machinery as a consequence of roading approval requirements harmonisation. The boost to product innovation can further **strengthen the competitiveness of the sector and especially that of SMEs** despite this effect being somewhat hampered by the increase in direct costs**.** Downstream sectors might also become more competitive due to the increased availability of product options.

On the negative side, the solution appears **not to be reducing direct compliance costs** in a longer time frame (e.g. ten years). Even though it has some positive impacts on indirect costs in terms of re-use and second hand market, this option contains risks of compensation by Member States in terms of stricter requirements for the overall machines or double testing.

When assessing the main **economic** impacts, a distinction needs to be made amongst the sub-options. All sub-options are expected to have a (slight) negative impact on the direct costs of manufacturers. The more demanding the sub-option is, the higher these costs will be. Policy option 2.1 (full self-certification) is the most cost-efficient for manufacturers as it is expected to only slightly increase direct costs (+€ 0.88 m). Its advantage is that it would (partially) cap the costs of direct compliance at more or less the same level as expected to be under Policy option 0. This would be a step in the right direction for manufacturers, but does not take into consideration the risk of a double testing situation where both the spare parts and the machines need to be tested. Moreover, extra requirements for the homologation of the machine as a whole are still able to increase diversity amongst homologation processes and hence generate direct costs. Policy options 2.2 and 2.3 foresee further cost increases which seem to be not outweighed by the positive economic impacts of this policy option. One economic impact on the downstream side of the value chain that needs to be taken into consideration is that already homologated spare parts or systems can be easier sold as second hand products throughout the Single Market.

From a **social** perspective, slight advantages of this policy option can be identified. The key advantage is an increased coherence of product components which should create a higher safety standard in areas in Europe where this is currently not the case. In addition, policy option 2.1 may decrease the number of staff needed in third-party testing bodies (under the assumption that the same Member States would not increase requirements for the whole vehicle at the same time).

The key advantage of this policy option in terms of environmental impacts is the increased re-usability of spare parts throughout the EU. This could reduce the amount of waste generated by the sector.

To sum up, this policy option is potentially a way forward, but it is difficult to envisage how this could exist alongside Member States' existing regulatory/administrative requirements which (presumably) would continue to operate in a similar way (and hence represent a similar level of burden). Therefore, the option may well result in a reduced need for whole-machine testing (and therefore reduced cost), but some 3rd party inspection would still be required. Administrative and certification costs would be unchanged.

The biggest problem of this option is the sheer variety and therefore **unpredictability of NRMM designs**. Unlike a car or truck which conforms to generally-accepted designs (and so utilisation of systems/components can be readily envisaged), NRMM can, literally, be "almost anything which moves". Because of this design variety, the variation in components/systems/technical units is also very great. For this practical reason this particular option may not be particularly viable. Moreover, self-certification of components/systems is unlikely to be acceptable for three reasons:

- Most are likely to be safety or vehicle-function critical in some way;
- Most are likely to have received (3rd party) approval/certification, possibly involving testing, at the point of original manufacture, prior to being supplied to the NRMM manufacturer;
- Thereafter 3rd party inspection (but arguably not testing) of the completed NRMM design would be required to ensure overall vehicle safety.

5.2.3 Impacts of policy option 3: Harmonised legislation for whole approval of mobile machinery

Table 5.5 Overview of key economic, social and environmental impacts of policy option 3: Harmonised legislation for whole approval of mobile machinery

Impact	Positive impact	Negative impact
Economic	- decreased direct costs for manufacturers under sub-options 1 and 2: **PO 3.1: - € 17.4 m**; **PO 3.2: - € 14.7 m**; - **no** inner-EU **market barriers** potentially increases trade flows; - more **homogeneous prices** of the same product throughout the internal market - **same access** and converging prices to machines across the EU for downstream clients; - potential for eliminating additional homologation costs due to national differences; - **boost to innovation** due to reduction of costs and time delays; - **improved sector** (and especially SME) **competitiveness** due to innovation and reduced direct and indirect costs;. - **improved access to second hand markets** and selling/purchasing of machinery; - Greatly reduced administration burden for public authorities.	- slight increase of costs under sub-option 3: **PO 3.3: + € 2.1 m** - in case of full third-party testing, increased costs due to increased payments - increased possible **market concentration** under self-certification as it favours large manufacturers.
Social	- in case of full third-party testing (PO 3.3), **increased and homogenous standard of safety** as all machines need to be third-party tested; - homogenous access to optimal innovative products.	- **less room for national authorities to further strengthen safety**; - risk for SMEs which are not able to profit from reduced market barriers and under harmonised legislation face stronger competition.
Environmental	- harmonised European Requirements and their impacts on environment - **increased possibility for "re-using"** machinery in other Member States and hence reduction of waste	- less room for national authorities to further strengthen requirements.

This policy option would be established under the European Commission's New Legislative Framework (as is the case with the Machinery Directive). According to the three sub-options below, the approval of the whole vehicle would occur through either 'self-certification' or 'part self-certification and part third party certification for safety critical components' or 'complete third party certification'. Policy option 3 is a policy option providing for a full harmonisation for the sector and hence addresses the issue of non-harmonisation in a complete form. It is therefore expected to have a series of positive impacts. However, it also contains certain risks depending on the specification of the policy option.

On the positive side, the policy option guarantees harmonised requirements for road approval across the Single Market and thereby **decreases direct costs for manufacturers** (under sub-options 3.1 and 3.2) and/or stops further cost increases due to national regulation (also incl. sub-option 3.3). The reduction of approval procedures necessarily **reduces time delays** of products

reaching markets. Furthermore, the absence of a need to obtain multiple national roading approvals reduces costs for both consumers and public authorities. Option 3 also means that all manufacturers are able to sell their machines for a more homogenous price[50]. in the whole EU which guarantees no competitive disadvantage of downstream clients based in particular Member States (of low interest to the producer due to market size). The eradication of entry barriers to national markets is **particularly important for SMEs** which so far have not been able to enter all markets due to capacity and cost impacts. This would substantially broaden the accessibility (shown in the accessibility index in chapter 3) further creating the potential for increased trade flows. This, combined with the reduction in procedures and time delays to market may result in **lowering the barriers to innovation** and research activities and combined with the reduction in direct and indirect costs eventually lead to an **increased sector competitiveness** In addition, agreed (and thus high) safety requirements throughout the EU are expected to guarantee a high level of road safety for all road users.

On the negative side, full third-party testing (sub-option 3.3) is still expected to have **slight increases in terms of direct costs** for manufacturers. On the other hand, the other extreme of full self-certification (sub-option 3.1) carries the risk of market concentration as it is more beneficial for large manufacturers than SMEs (large manufacturers mostly have already full self-testing facilities in place, while SMEs would still have to rely on third parties). Moreover, non-harmonisation may have been used for protective measures to indirectly support SMEs in smaller and very restrictive markets. Such protection would not be possible anymore under a harmonised framework. In addition it is important to agree on high safety requirements, as under this policy option national authorities will not be able anymore to independently lift their requirements.

In terms of **economic** impacts, the policy option is **very beneficial for manufacturers** which is directly visible in the reduction of direct costs under sub-options 3.1 and 3.2. A slight increase, but full capping of costs, applies to sub-option 3.3. The implementation of this policy option in all three forms ensures a harmonised homologation process which 'guarantees' the functioning of the Single Market for new mobile machinery, but also for second-hand products. It takes away market entry barriers which allows for fair downstream competition between clients located in different Member States. Additionally, manufacturers will be able to make use of their staff in more productive ways as the homologation process is reduced by the multiplication factor of markets. This could lead to more investments in innovation or a further strengthening of EU exports to third countries. Furthermore, EU requirements may serve as the basis for international standards, if harmonised and thus support the position of the EU in international standardisation processes. Finally, this policy option would improve access to the market for second hand machinery.

In terms of **social** impacts, this policy option in all forms provides a harmonised (and expected) high standard of road safety for all EU citizens. Even though it will remain a labour intensive activity to homologate machines, the duplication (or multiplication) of efforts will be reduced (meaning that the same machine or type of machines does not need to be homologated in e.g. DE, FR and IT, but conducting one of the processes will be enough to reach out to the whole EU market). Consequently, national authorities or third-party testing bodies will be less needed. However, any adverse employment effects on employment in third-party testing bodies can expected to be limited. There may be a certain shift of activity towards geographical focus areas where most manufacturers homologate their machines.

[50] Note: the price also depends on other factors such as transport cost, market demand and competition. The assessment in chapter 3.4 suggests however that a decrease of prices can be expected in case of harmonisation.

From the **environmental** perspective, guaranteed same (and high) requirements across the EU can be mentioned. Increased possibility for "re-using" machinery in other Member States and hence reduction of waste can be considered another advantage, especially so in smaller Member States.

To sum up, this policy option guarantees the functioning of the Single Market for NRMM, reduces and/or caps costs and guarantees equal safety standards for all EU citizens.

Policy option 3.1 (self-certification), is **particularly interesting for large producers** that have the capabilities to do so. SMEs would further rely on homologation consultants. This policy option reduces time delays, abolishes payments to third-party testing and potentially compromises vehicle safety standards. The risk in case of full self-certification is that some manufacturers may be diligent in their assessments, whilst others may not. This would raise the question of how to assess/maintain the standards. The main example would be the US-type consumer litigation which is currently not in line with EU consumer practice. Smaller companies may even be prepared to take the risk.

Policy option 3.2 (partial self-certification) is still a simplification to policy option 0. It guarantees a harmonised approach throughout the EU which reduces duplication of efforts. Having key components third-party tested, while others self-certified seems a logical and balanced policy option which could be agreed upon also by currently strict Member States. The challenge of the policy option lies however in the detail as the sector consists of such a high level of complexity/variability of NRMM design that it will be **difficult to find common requirements to agree upon and points of division** between what needs to be self-certified and what 3rd party tested.

Policy option 3.3 (full third-party testing) is more clear and very strict in comparison to policy option 3.2. The challenge of this policy option is that the **positive effect of cost savings may be outbalanced by the intensity of third-party testing** of all machines. However most third-party testing consists less of 'testing' than of 'inspections' which is less costly.

5.2.4 Impacts of policy option 4: EU Type approval

Table 5.6 Overview of key economic, social and environmental impacts of policy option 4: EU Type approval for mobile machinery

Impact	Positive impact	Negative impact
Economic	- **in the long run costs** for manufacturers are expected to **decrease** as they will be capped at a specific level (and manufacturers will not have to familiarise themselves with different legislations/procedures anymore); - manufacturers would select machine (type) designations to minimise variations at least for homologation purposes. This reduces administrative workloads for both manufactures, dealers, authorities and end-users. - **better functioning of the Single Market**; through the abolishment of market barriers; - potentially increased trade flows;	- increased direct costs (at least in the short run): **PO 4.1: + € 10.4 m;** **PO 4.2: + € 6.1 m.**

	- **potential boost of product innovation** due to reduced market entry barriers; - possible **increase in sector competitiveness** (esp. SMEs); - **improved access to second hand markets** and selling/purchasing of machinery enhances the competitiveness of downstream sectors; - **Reduced administrative burden for public authorities.**	
Social	- homogenous access to optimal innovative products.	
Environmental	- harmonised high European Requirements causing lower negative impacts on environment; - **increased possibility for "re-using"** machinery in other Member States and hence reduction of waste	- less room for national authorities to further strengthen requirements

Under this option, EU type approval bodies would approve either components or the whole vehicle. The legislation could operate in a similar way as the type approval of agricultural tractors currently. Having one common EU type approval appears to be a cheaper and more coherent format of harmonisation at a first glance. It is thereby the alternative towards full harmonisation in addition to policy option 3. Manufacturers however seem to have a certain hesitation towards this policy option.

On the positive side, policy option 4 **guarantees harmonised requirements** for road approval across the Single Market creating the potential for increased intra-European trade flows. It also caps the costs of homologation for manufacturers at a certain level which is however expected to be higher than under Policy option 0. As for Policy option 4 it **generates a level playing field for all stakeholders** and provides the possibility for downstream clients to access the same machines for the same (or at least similar) price. Moreover, it abolishes market entry barriers into national markets which is **particularly important for SMEs**. The increased market access for SMEs combined with the expected a reduction in time delays to introduce new products (as fewer approval procedures will be needed) will most probably **trigger product innovation**. Despite the slight increase in direct costs, option 4 is still expected to have **a positive impact on sector competitiveness** via the integration of the internal market and the expected boost to innovation caused by the provision of clarity on requirements and processes for roading approval. Further **downstream sectors will also gain in competitiveness** from the increase in product availability. Finally, also public authorities will be relieved from a big portion of the administrative burden as they will not be required to repeat road approval processes for the same types of machinery.

In addition it provides a high level of road safety for all EU citizens. Finally, this policy option would improve access to the market for second hand machinery. On the negative side, manufacturers seem to also **fear an increase in costs for compliance** due to the probable picking of the most acceptable, rigorous and robust requirements in all Member States as common denominator and the absence of any self-certification possibility.

In terms of **economic** impacts, policy option 4 has negative impacts on direct costs (at least) in a 10 year time frame, but is expected to generate positive impacts on indirect costs due to its

harmonisation advantages (see also policy option 3). In addition it is expected that manufacturers would select machine (type) designations to minimise (practical) variations, at least for homologation/approval purposes. This would reduce the number of 'types' submitted for homologation and so further reduce both the testing/inspection and administrative workloads in the long-run.

In terms of **social** impacts, policy option 4 is similar to option 3, but entails the move from national type approval bodies to an EU body. This could cause a swift in workforce and therein cause a difficulty in implementing the measure.

In terms of environmental impacts, policy option 4 equals policy option 3. From the **environmental** perspective, guaranteed same (and high) requirements across the EU can be mentioned. Increased possibility for "re-using" machinery in other Member States and hence reduction of waste can be considered another advantage, especially so in smaller Member States.

To sum up, policy option 4 is an option which is expected to generate economic benefits (at least indirect) in the long run, but risks to increase costs in the short run. The option guarantees the functioning of the Single Market and high levels of safety throughout the EU. Given that an agreement on common requirements would be needed, it is expected that these would contain the maximum of strictness which causes short term costs. The variety of NRMM designs will undoubtedly hinder implementation of this option. The possibility of self-certification (popular amongst large manufacturers) is not expected to be an option.

5.3 Conclusions

Based on the survey results, all policy options under observation need to be compared with policy option 0 ('do nothing) to assess their relative advantages or disadvantages. A series of impacts could be observed which differ between policy options in terms of occurrence, strength and direction (positive versus negative). Some impacts can be presented in quantitative form (e.g. direct costs – further details on the cost calculations are presented in Annex III.6) while others are assessed in a qualitative way. The following chapter provides the comparison of policy options taking into account the impacts assessed.

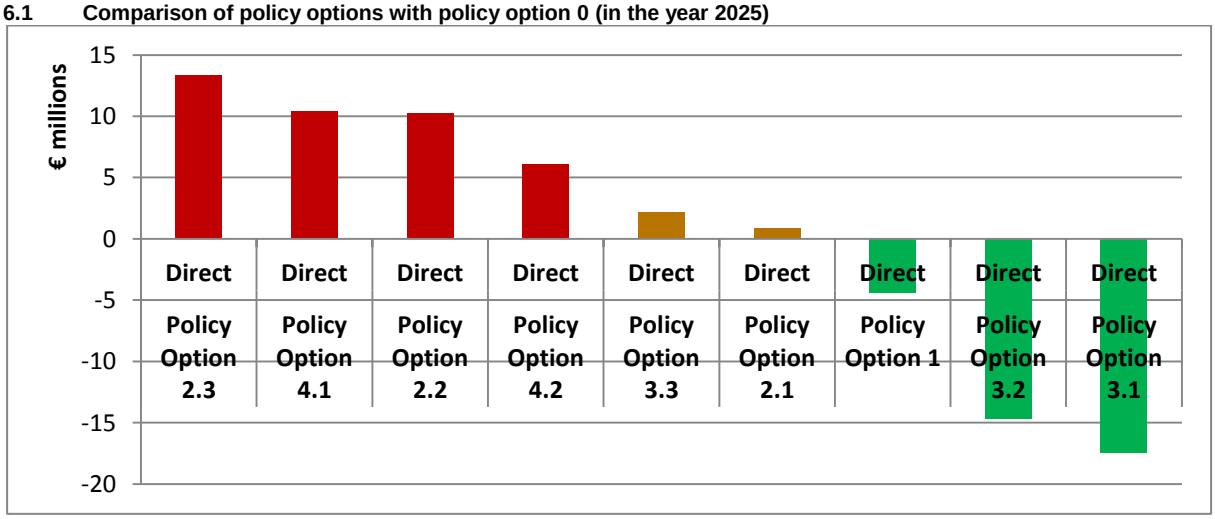
6 Comparison of policy options

This chapter consists of a comparison of policy options presented and assessed above. It first compares the costs and benefits of the options, then provides a comparison in terms of effectiveness, efficiency and coherence, describes the stakeholders affected and elaborates on the impacts on competitiveness.

6.1 Costs & benefits

The following figure compares all policy options with policy option 0 in terms of direct costs (the detailed underlying calculations to compare policy options are presented in ANNEX III.6).

Figure 6.1 Comparison of policy options with policy option 0 (in the year 2025)



Source: Ecorys based on manufacturers survey

The **preferred options** concerning direct impacts are **policy options 3.1, 3.2 and 1**. Policy option 1 is however seen with large suspicion amongst stakeholders as it has not proven to be efficient and feasible in the past. For manufacturers all policy options show increasing efforts for homologation in Member States with currently low requirements. This is however outweighed by the advantage of abolishment of duplication of efforts under policy options 3.2 and 3.1. Policy option 1 is only perceived to be “theoretically” beneficial under the assumption “that it works”. All other policy options do create higher direct costs, but are still qualitatively seen as more advantageous than policy option 0 by the consulted stakeholders. This is also linked to the indirect costs which could not be quantified.

Despite the non-measurement of indirect costs, they need to be taken into consideration when assessing costs and benefits of policy options. For example, the impact on competitiveness and trade flows cannot be quantified. It can however be stated that any type of further harmonisation of requirements will increase the competitiveness of the sector in terms of general healthiness of the sector and in terms of relative competitiveness on an international level. Thereby it needs to be stated that the higher the degree of harmonisation, the stronger the positive long-term impact will be. Hence policy options 3 and 4 have a stronger impact on the sector than policy option 2, which however still rates positively compared to the baseline option. In addition, intra-EU trade will

increase equally to the level of competitiveness with the extent of harmonisation due to the facilitation of trade. Extra-EU trade may also increase. On the one hand this is due to accepted international standards (following the EU example), on the other towards the EU due to the easier access to a larger market. The following table assesses qualitatively the impacts of all policy options in terms of indirect costs.

Qualitative assessment of policy options

The impacts of each policy option were assessed in quantitative and qualitative terms depending on the indicator chosen. A pure quantitative assessment cannot be made. To include the qualitative assessment of impacts into the overall judgement the method of expert judgement is used. Therefore, we introduce a 'benefit scale' from 0 - +++ where '0' means no advantage in comparison to policy option 0 and '+++' the highest possible benefits. The judgement takes into consideration the relative quantitative advantages of a policy option and the qualitative ones.

Table 6.1 Qualitative assessment of indirect costs vs benefits of all policy options

Policy option	Sub-option	Indirect costs vs benefits assessment
Policy Option 1: Mutual recognition		0
Policy Option 2: Harmonised legislation for systems/components/separate technical units	Self-certification	+
	Part self-certification and part third party certification	+
	Complete third party certification	+
Policy Option 3: Harmonised legislation for the whole approval	Self-certification	++
	Part self-certification and part third party certification	+++
	Complete third party certification	+++
Policy Option 4: EU type approval	EU separate system and component type approval or	++
	EU whole vehicle type approval	+++

Legend: Scale from "0" (=no difference) to triple plus "+++" (= most beneficial change)

Combining direct and indirect assessment shows that **policy options 3.3 and 4.2 should also be taken into consideration** in addition to policy options 3.1 and 3.2. Policy option 1 is seen as not feasible and should hence be disregarded. Policy option 2.1 is seen as a slightly positive option, but less positive than others.

6.2 Comparison in terms of effectiveness, efficiency and coherence

In addition to the assessment of costs and benefits of policy options, the options need to be compared in terms of effectiveness, efficiency and coherence.

Assessment of effectiveness, efficiency and coherence criteria

To assess the three criteria the following three questions need to be answered:

- **Effectiveness**: To what extent are expected objectives achieved?
- **Efficiency**: Are the objectives achieved at lowest cost?
- **Coherence**: Is the policy option coherent with the overarching objectives of EU policies?

The first and second criteria rely on the quantitative and qualitative assessment of impacts elaborated upon above. The third criterion qualitatively takes into account the 'wider picture'. The criteria are assessed in a qualitative form using a scale from '0' – '+++' comparing the policy options to policy option 0.

The following table provides an overview assessing each (sub-) option:

Table 6.2 Comparison in terms of effectiveness, efficiency and coherence

Policy option	Sub-option	Effectiveness	Efficiency	Coherence
Policy Option 1: Mutual recognition		0	0	0
Policy Option 2: Harmonised legislation for systems/components/separate technical units	Self-certification	+	+	0
	Part self-certification and part third party certification	+	+	+
	Complete third party certification	+	+	++
Policy Option 3: Harmonised legislation for the whole approval	Self-certification	++	+++	+
	Part self-certification and part third party certification	+++	++	+++
	Complete third party certification	+++	+	+++
Policy Option 4: EU type approval	EU separate system and component type approval	+	+	+++
	EU whole vehicle type approval	+++	++	+++

Legend: Scale from "0" (=no difference) to triple plus "+++" (= most beneficial change)

In terms of effectiveness, policy options 3.2, 3.3 and 4.2 are seen as the most beneficial options. They all achieve a full functioning of the Single Market and create a level playing field. Furthermore, they guarantee the highest possible of safety for road users across the EU. Option 3.1 is also seen as effective, but it contains the risk of no sufficient control of self-testing.

In terms of efficiency, policy option 3.1 is seen as the most beneficial solution. Many companies are already conducting extensive tests before going into third-party testing. Allowing them to self-certify would substantially reduce costs, while generating a harmonised level playing field. Also efficient but more costly are policy options 3.2 and 4.2.

In terms of internal coherence of the scheme, policy options 3.2, 3.3, 4.1 and 4.2 are preferable. All of these options guarantee a coherent implementation of road safety throughout the EU. Self-certification is considered somewhat less coherent as it will play out differently for different types of producers. With regard to external coherence, policy options 2 and 3 come closest to existing in the area of machines (Machinery Directive), whilst policy option 4 is expected to be more coherent with the Tractor Regulation.

Combining the three indicators, **policy options 3.2 and 4.2 are considered the most effective, efficient and coherent options**.

6.3 Stakeholders affected

All policy options affect all stakeholders of mobile machinery in a certain way. The main groups affected by the problem of non-harmonisation are:

1. **Mobile machinery manufacturers and dealers:** they are the first and most obviously and directly affected group. The complex interplay between roading approval and compliance costs leads to higher administrative, logistic, administrative, manufacturing, design, translation and consulting costs. These have knock-on effects or indirect industry costs such as time delays, reduced product innovation, higher product prices or squeezed profitability or barriers to market entry effecting the competitiveness of the sector. Particularly the aspect of barriers to market entry is of key importance to SMEs;
2. **Downstream clients (construction and agro/forestry industry)**: depending on the market power and the specific situation in a market, indirect costs are further passed on to downstream clients impacting them in terms of time delay, access to sub-optimal products, differentiated or increased costs and reduced access to machines;
3. **Citizens at large**: these are affected mainly in the form of road users as they have to carry the costs of an increased number of road accidents in areas of substandard road safety requirements;
4. **Member State authorities and third-party testing bodies**: these are mirrored bodies towards the efforts of group 1 which are affected by regulation in terms of updating and enforcing requirements.

Policy option 1 mainly impacts large manufacturers and Member State authorities. Given the strong need for proof of technical equivalence, policy option 1 increases the efforts undertaken by these groups of stakeholders. In case of acceptance all other stakeholders can benefit from the rule.

Policy option 2 positively impacts downstream clients as they can easier re-use/re-sell spare parts of their machines. It also positively impacts manufacturers and dealers as it would slightly decrease their costs. Within the group of manufacturers, a distinction needs to be made between sub-options. **Self-certification** (Policy option 2.1) is particularly **beneficial for large manufacturers** which can easily conduct self-certification in-house. SMEs on the other hand would still need to rely on external expertise. **Full third-party testing** (Policy option 2.3) would represent a **more level playing field for SMEs**. This sub-option however would also strongly increase the efforts to be undertaken by third-party testing bodies.

Policy option 3 has **stronger positive impacts** than policy option 2 **on all stakeholders** affected. **Direct and indirect costs of industry would decrease** and downstream clients would receive harmonised machines guaranteeing **equal access to similarly priced machines** throughout the EU. For some authorities and third-party testing bodies Policy option 3 would mean an increase of work as manufacturers may move their homologation activities to the respective country. Furthermore, it can be expected that only very high requirements could be agreed upon as a common standard outreaching the currently highest requirements. As for policy option 2, the sub-options need to be distinguished in their impacts on stakeholders. **Policy option 3.1 (self-certification) is in favour of large enterprises**, while 3.3 (full third-party testing) is more beneficial also for SMEs. Self-certification may not be entirely beneficial for citizens at large as it requires enforcement which could only be guaranteed in a strong litigation culture. Therefore, self-certification contains a certain increased risk of undermining safety requirements in comparison to

third-party testing. Policy option 3.3 is however overall quite intense as all machines would require third-party testing which again increases the efforts of public bodies.

Policy option 4 has similar positive impacts as Policy option 3. Even though direct costs on manufacturers seem not to be expected to decrease within a 10 year time frame, they are to be decreased or at least stabilised in the long run. The option is **not very popular among large manufacturers** as it does not contain any aspect of self-certification. For public bodies it would mean a shift of efforts across domains of activity.

6.4 Conclusion & Monitoring Indicators

Non-harmonisation of requirements for the road circulation of mobile machinery in the EU causes several layers of costs for industry and other stakeholders and therefore harms the competitiveness of the industry in the EU. In addition, it reduces the well-functioning of the Single Market and increases the risk of road accidents in areas of lower standard requirements.

The problem assessment shows that there is a clear link between direct industry costs of compliance with differing requirements and the negative impacts on the functioning of the Single Market for downstream clients. It also shows that direct costs are substantial for the sector and are still expected to increase in the future. Even though not being measurable, indirect costs are also expected to further increase over time.

From a direct industry cost perspective, policy options 3.1, 3.2 and 1 are considered the most beneficial ones. Policy option 1 should however be disregarded as it appears to be not functioning for the mobile machinery sector. On the other hand, policy options 3.3 and 4.2 need to be taken into consideration following the assessment of indirect costs. Taking also the assessment of effectiveness, efficiency and coherence as well as the stakeholders affected into consideration for the assessment of policy options, policy option 3.1 and 3.3 should be disregarded. **Consequently, policy options 3.2 and 4.2 appear to be the most beneficial one's.**

While policy **option 3.2 shows an equal balance of self-certification and third-party testing and indicates direct cost savings for the sector**, it contains the challenge of implementation due to the sheer variety of mobile machinery designs for which a harmonised set of requirements needs to be found. Policy **option 4.2** on the other hand leads to an increase of direct costs in the short run and is less popular among manufacturers due to a lack of self-certification. It may however be **easier to be implemented** and in the long run also provide a **reduced cost impact**.

Once implemented, the actual impacts of the chosen policy option need to be monitored and compared to the objectives and the expected impacts. Clear indicators need to be set at an early stage to collect the necessary information. At least the following three indicators are proposed:

- **Direct cost of compliance**: This indicator can only be assessed through a survey based SCM exercise (as conducted in the framework of this study). Conducting such a survey again after full implementation of the new legislation provides a comparative figure, however care should be taken with regard to the frequency and timing of such a survey as it implies additional work for the companies participating;
- **Number of third party tests**: Compare the ratio third-party tests/sold mobile machines before and after implementation of the new legislation. Take into account the possible impact on increased or decreased third-party testing obligations to assess the impact on 'double/triple testing';
- **Price development**: Conduct an assessment of the price development. Verify if a price harmonisation is taking place.

ANNEX I: Methodology for quantification of the sector (industry and market assessment)

The market analysis has been primarily based on the PRODCOM database. As described in the introduction chapter, a selection of NACE Rev.2 product codes was made in order to draw information for an initial assessment of market size. After identifying the most important product lines in matters of production and market share and the largest MS markets, this preliminary assessment was discussed in a workshop with industry experts. This workshop session resulted in updating the market assessment figures accounting for the input of the industrial associations regarding the participation of the selected (and other codes) in the product mix within the scope of this study and the expected market trends.

The confidentiality closure of the PRODCOM dataset does not allow for revealing product-code specific data per country when there are less than 3 production enterprises active in the sector. We have tried to derive an approximate production share of these EU countries based on estimations from industry sources on the production levels of the different countries for a number of product lines. Material used to derive such estimations includes publications and presentation by industry associations.[51] For product lines where this has not been possible, the total production value for EU countries where data were available has been subtracted from the total EU value and the remaining undistributed production value has been distributed on equal terms among the countries for which no data have been made available. Due to this assumption, the production share of countries with a few yet large producers might be underestimated, while that of countries with only small producers might be somehow inflated. In any case we expect this effect to largely balance off when considering the total of product lines and not considerably affect the estimated market shares. This has been confirmed at the expert workshop were the assessment of market shares per country (as described in the following paragraphs) has been agreed to be reasonable.

Further, the PRODCOM database provides only figures on production, imports and exports in matters of value and product units. Therefore, the specific calculation of the EU market value for mobile machinery has been based on the estimation of the "apparent consumption" indicator. This indicator is derived on the assumption that EU consumption of mobile machinery can be derived by the sum of the EU production and imports of the selected product codes after subtracting EU exports as seen in the following formula..

Apparent Consumption = Production value + Imports value - Export value.

The *apparent consumption* indicator produces just an estimation of the actual market size for each product line and each Member State market. That is because the calculation of this indicator is implicitly taking into account also the selling price for imports and exports when estimating the domestic market size. This is in principle of little impact in the estimation of the market shares of the various countries, except in the case where a country is a major import/export hub or contains large distribution centres of the product under examination. In this case, the value added to the product during the logistic processes with the country is also accounted in the exports section of the calculation formula and is therefore subtracted from the market size of the country. In cases of

[51] VDMA, Harvesting Machinery Report, June 2015, CECE annual economic report. March 2015, Agrievolution Market report 2014,

countries with extended activities in the logistic fields described before, which however contain only limited industry of the sector this can accumulate to be a substantial part.

To overcome the limitation above, an analysis of average import and export unit prices has been made for the product lines and countries for which a negative apparent consumption was calculated. This analysis drew on the value and number of product units imported or exported. The apparent consumption for a number of product lines has been negative for a few countries. Characteristic examples are the case for Belgium and to a lesser degree that of Italy. Both these countries act as regional import/export hubs and therefore this behaviour is to a large decree justifiable. For the product lines, where the export average price was found to be larger than the import price, the exports have been recalculated using as export prices the import prices for each of the product lines at stake. This has been confirmed at the expert workshop, were the assessment of market shares per country and product line has been agreed to be in accordance with the view of the industry experts.

The market trends regarding EU apparent consumption value over the last decade are derived for the whole of the mobile machinery sector by analysing the time series of the data obtained for the most significant product categories. The past trends have been complemented by the short-term industry outlook forecasts for the following 2-3 years. A long term forecast has been derived accounting for the industry performance over the last 5-10 years; a high and a low 10-year forecast is produced for both the “construction” and “agriculture” market segments after consultation with the industrial experts during a workshop session.

ANNEX II: Technical investigation

ANNEX II.1: Methodological approach

Information on technical requirements has been collected through desk research (on eight Member States: AT, DE, FR, IT, EL, PL, SE, ES), exchange with industry associations, the approaching of 123[52] national regulatory bodies across the EU and the companies survey. The technical fiches were then verified by NRMM experts.

First, the template for the technical investigation was created in close cooperation with NRMM experts in order to provide a complete overview of technical requirements categories. The template included technical requirements categories relevant for various types of machines, thus making it easier to compare the differences between the Member States.

As a next step, country researchers (from Ecorys) fluent in the local language of the respective Member State have collected information on technical requirements for eight Member States (AT, DE, FR, IT, EL, PL, SE, ES). While filling in the fiches, data on factors which were already covered by new harmonising regulations such as the Machinery Directive 2006/42/EC (unless any interaction between certain pieces of national legislation for mobile machinery with harmonised requirements is found to be relevant as part of the problem analysis) was excluded.

At the same time, 123 contact details to national regulatory bodies across the EU were collected through an exchange with industry associations and the European Commission. All these national regulatory bodies were approached, but only eight have responded. As a result, national legislation for eight Member States was collected (BG, ES, FI, SE, NL, EE, SV, UK).

The information provided in the companies' survey verified the accuracy of some important technical requirements. Surveyed companies have often provided examples of most burdensome technical requirements in one or several Member States (most often mentioning FR, IT and DE). These examples were used to verify, if the information provided by the companies was in line with the technical fiche. Finally, NRMM experts have conducted fact checking of the technical fiches in order to assess the factual accuracy of the information.

ANNEX II.2 : Legislative overview of technical requirements for NRMM in France, Italy and Germany

Legislative overview of technical requirements for NRMM in the three most demanding countries is presented below. For each of the technical requirements the corresponding legislation (if available) including a web link and brief description of requirement was provided.

[52] The response rate amongst national regulatory bodies was around 10 %

Legislative overview of technical requirements for NRMM in France

Category	Technical Requirement	Legislation	Brief description of requirement	Web link to the legislation
Vehicle Performance & Control	Steering			
	Braking	Arrêté du 18 août 1955 *relatif au freinage des véhicules automobiles* Art 40-48	if max speed ≤25 km/h, vehicle whose initial speed is 20km/h must stop in less than 10 m	http://legifrance.gouv.fr/affichTexte.do;jsessionid=AE2F2FE91C1CE3B847B541AD160E0FF0.tpdila20v_3?cidTexte=LEGITEXT000027297813&dateTexte=20150604
	Max. Speed	art R413 Code de la Route Arrêté du 4 mai 2006	40 km/h if width ≤ 2.55 m or if the limits of engine capacity are larger than for motor quadricycles Group B: 25 km/h	http://www.legifrance.gouv.fr/affichTexte.do?cidTexte=LEGITEXT000006053683
	Speedometer			
Vehicle Dimensions	Max. Weight	R312-4	2-axle vehicle: 19t	http://www.legifrance.gouv.fr/affichCode.do?idArticle=LEGIARTI000006841583&idSectionTA=LEGISCTA000006177084&cidTexte=LEGITEXT000006074228&dateTexte=20090513#LEGIARTI000006841583
	Max. Length		22 m	
	Max. Width	Arrêté du 4 mai 2006 relatif à la *circulation des véhicules et matériels agricoles ou forestiers et de leurs ensembles*	4,5 m	http://www.legifrance.gouv.fr/affichTexte.do?cidTexte=LEGITEXT000006053683
	Max. Height			
Road Surface Protection	Max. Axle Loading			
	Max. Surface Contact Pressure			
	Requirements for Tracked Vehicles			

Category	Technical Requirement	Legislation	Brief description of requirement	Web link to the legislation
Vehicle Awareness	Lighting	Art R313 1-32	Two rear position lamps are required. Vehicles can be equipped with two or four mainbeam headlamps, two additional dippedbeam headlamps, outermost two front position lamps and two stop lamps.	http://www.legifrance.gouv.fr/affichCode.do?idArticle=LEGIARTI000006841614&idSectionTA=LEGISCTA000006177087&cidTexte=LEGITEXT000006074228&dateTexte=20090513#LEGIARTI000006841614
	Signalling		IF width≥ 2.55m, it is compulsory to have an illuminated square panel in the upper-front part of the vehicle, that is visible from the front and the back from a distance of 150 m on clear days. it must have a letter D on a black background, with a height of 0.20 m	
	Reflectors			
	(Rotating) Warning Beacons			
Vehicle Markings	Registration Plate	R317-8	White coloured registration plate compulsory in the front of the vehicle. At their choice they could put a fixed identity plate with the identity number in the front of the vehicle	http://www.legifrance.gouv.fr/affichCode.do;jsessionid=E6DBFA5552CB85D465F8AEAE4297018B.tpdila11v_2?idSectionTA=LEGISCTA000006159529&cidTexte=LEGITEXT000006074228&dateTexte=20150609
	Max. Speed Marking	R413	Vehicles whose speed limits are regulated according to their weight or their mode of operation must bear a clear and visible from the back marking indicating the maximum speed which they shall not exceed	http://www.legifrance.gouv.fr/affichCode.do;jsessionid=E6DBFA5552CB85D465F8AEAE4297018B.tpdila11v_2?idSectionTA=LEGISCTA000006159544&cidTexte=LEGITEXT000006074228&dateTexte=20150609
	Warnings to Other Road Users	arrêté du 4 mai 2006	In case the vehicle constitutes a danger for the circulation, light emergency flares (if existing) must be placed and a warning triangle at 30m distance.	http://www.legifrance.gouv.fr/affichTexte.do?cidTexte=LEGITEXT000006053683

Category	Technical Requirement	Legislation	Brief description of requirement	Web link to the legislation
	Other Plates / Markings	R. 313-1 à R. 313-32 arrêté du 4 mai 2006	Group A: continue lighting; board with red and white stripes on outermost point of the protruding part of the vehicle; reflectors. Group B: two rectangular retro-reflective markings of "Convoi agricole", one in the front the other in the rear of the vehicle. Panels must be written in capital letters, with dimenision of 1,90 m x 0,25 m in the entry is on one line, or 1,20 m x 0,40 m if the entry is on two lines	http://www.legifrance.gouv.fr/affichTexte.do?cidTexte=LEGITEXT000006053683
Operator Vision	Operator Field of Vision	Art R 316-2	if the filed of vision is not wide enough for the driver to safely drive, it shall be led by an attendant preceding the vehicle	http://www.legifrance.gouv.fr/affichCode.do;jsessionid=BED81EC1CEA042BAA7829E8BF3A2AFBA.tpdila24v_2?idSectionTA=LEGISCTA000006159582&cidTexte=LEGITEXT000006074228&dateTexte=20090513
	Mirrors			
	Windscreen Wipers & Washers			
	Cabin Glazing			
Operator Environ-ment / Protection	Cabin Seat, Door, Heating/Ventilation	R317-26-1	Possibility to have co-driver seat	http://www.legifrance.gouv.fr/affichCodeArticle.do?cidTexte=LEGITEXT000006074228&idArticle=LEGIARTI000006841728&dateTexte=&categorieLien=cid
	Operator Seat Belt			
	Vehicle Roll-Over Protection			
Vehicle Design	Tyres and/or Tyre Rims	R 314-3	For wheeled vehicles, tyres shall not have on the sides any deep rupture and no fabric must be visible on either the surface or the base of the tyre tread pattern.	http://www.legifrance.gouv.fr/affichCode.do;jsessionid=BED81EC1CEA042BAA7829E8BF3A2AFBA.tpdila24v_2?idSectionTA=LEGISCTA000006159580&cidTexte=LEGITEXT000006074228&dateTexte=20090513

Category	Technical Requirement	Legislation	Brief description of requirement	Web link to the legislation
	Fenders / Mudguards			
	Fuel Tank / Cap			
	Mechanical (towing) Couplings			
Environ-mental Protection	Noise Emissions			
	Engine Exhaust Emissions	Art R 224-7	Engines of non road mobile machinery shall be type-approved according to types of pollutants	http://www.legifrance.gouv.fr/affichCode.do;jsessionid=E6B9E06FC6E514BCE218A094E8D9E81D.tpdjo09v_1?idSectionTA=LEGISCTA000006189064&cidTexte=LEGITEXT000006074220&dateTexte=20140206

Legislative overview of technical requirements for NRMM in Italy

Category	Technical Requirement	Legislation	Brief description of requirement	Weblink to the legislation
Vehicle Performance & Control	Steering			
	Braking			
	Max. Speed	art 142 Nuovo Codice della Strada	Wheeled mobile machinery: 40 km/h Tracked mobile machinery: 15 km/h	http://www.aci.it/i-servizi/normative/codice-della-strada/titolo-v-norme-di-comportamento/art-142-limiti-di-velocita.html
	Speedometer			
Vehicle Dimensions	Max. Weight	art. 62 Nuovo Codice della Strada	Depends on the number of axles: -1 axle: 6 t -2 axles: 14 t -3 or more: 20 t	http://www.aci.it/i-servizi/normative/codice-della-strada/titolo-iii-dei-veicoli/art-62-massa-limite.html
	Max. Length	artt 61, 114 Nuovo Codice della Strada	12 m	http://www.aci.it/i-servizi/normative/codice-della-strada/titolo-iii-dei-veicoli/art-61-sagoma-limite.html
	Max. Width	artt 61, 114 Nuovo Codice della Strada	2.55 m	http://www.aci.it/i-servizi/normative/codice-della-strada/titolo-iii-dei-veicoli/art-61-sagoma-limite.html
	Max. Height	artt 61, 114 Nuovo Codice della Strada	4 m	

Category	Technical Requirement	Legislation	Brief description of requirement	Weblink to the legislation
Road Surface Protection	Max. Axle Loading	art 62 Nuovo Codice della Strada	◦≤ 10 t for the load on the maix axle ◦The mass corresponding to the load on the main axle ≤ 20 % of the total mass if the distance between two contiguous axles is ≤ 1.2 m, the maximum mass loading on the two contigous axles is 11 t; if the distance is ≥ 1.2 m, the maximum mass is 14 t	http://www.aci.it/i-servizi/normative/codice-della-strada/titolo-iii-dei-veicoli/art-62-massa-limite.html
	Max. Surface Contact Pressure	art 62 Nuovo Codice della Strada	The mass transmitted to the groud by the driving axle in static condition shall not be: ◦ ≤ 20 % of the total mass of the vehicle in order of running order ◦ ≤ 15 % for vehicles with lower speed than 15 km/h ◦ ≤ 13 % for tracked vehicles	
	Requirements for Tracked Vehicles	art 62 Nuovo Codice della Strada	◦For semi-tracked vehicles the maximum loading on the main axle must be ≤ 13 % and in total not exceed 16 t	
Vehicle Awareness	Lighting		Front lights: 2 white position lights, 2 white dipped-beam and 2 main-beam lights, 2 yellow flashing signals Rear lights: 2 red position lights, 2 red stop-lamps, 1 plate light, 2 retro-reflectors, 2 yellow flashing signals Side lights: 2 yellow flashing signals	
	Signalling			
	Reflectors			
	(Rotating) Warning Beacons	art 104 Nuovo Codice della Strada art 266 Regolamento di Attuazione	Warning beacons are requested, they have to be yellow or orange, put in the highest part of the vehicle ans shall not be removed. Visibility of at least 10° upwards and downwards must be ensured from the horizontal plan starting from the optical centre position of the device. The optical centre	http://www.aci.it/i-servizi/normative/codice-della-strada/titolo-iii-dei-veicoli/art-104-sagome-e-masse-limite-delle-macchine-agricole.html

Category	Technical Requirement	Legislation	Brief description of requirement	Weblink to the legislation
			position must be placed at a height of 2 m min.	
Vehicle Markings	Registration Plate	113-114 Nuovo Codice della Strada art. 258 Regolamento di Attuazione	Obligation of a rear registration plate only. The registration plate must contain the registration data	http://www.aci.it/i-servizi/normative/codice-della-strada/titolo-iii-dei-veicoli/art-114-circolazione-su-strada-delle-macchine-operatrici.html
	Max. Speed Marking	art 106	In the rear, a retro-reflective marking with a diameter of 20 cm must be placed to signal the speed limits. The marking shall have red margins, white background and black figures.	http://www.aci.it/i-servizi/normative/codice-della-strada/titolo-iii-dei-veicoli/art-106-norme-costruttive-e-dispositivi-di-equipaggiamento-delle-macchine-agricole.html
	Warnings to Other Road Users			
	Other Plates / Markings			
Operator Vision	Operator Field of Vision			
	Mirrors	art 106	Obligation of rear-view mirror at least on the left side	http://www.aci.it/i-servizi/normative/codice-della-strada/titolo-iii-dei-veicoli/art-106-norme-costruttive-e-dispositivi-di-equipaggiamento-delle-macchine-agricole.html
	Windscreen Wipers & Washers			
	Cabin Glazing			

Category	Technical Requirement	Legislation	Brief description of requirement	Weblink to the legislation
Operator Environment / Protection	Cabin Seat, Door, Heating/Ventilation	art 106	Number of seats: not greater than 3 (driver included)	http://www.aci.it/i-servizi/normative/codice-della-strada/titolo-iii-dei-veicoli/art-106-norme-costruttive-e-dispositivi-di-equipaggiamento-delle-macchine-agricole.html
	Operator Seat Belt			
	Vehicle Roll-Over Protection	art 106	Obligation of a safety cab or frame (tracked vehicles excluded) for circulation in public roads. Obligation of a removable device to protect most dangerous part of the machinery for circulaton in public roads.	http://www.aci.it/i-servizi/normative/codice-della-strada/titolo-iii-dei-veicoli/art-106-norme-costruttive-e-dispositivi-di-equipaggiamento-delle-macchine-agricole.html
Vehicle Design	Tyres and/or Tyre Rims			
	Fenders / Mudguards			
	Fuel Tank / Cap			
	Mechanical (towing) Couplings	106 Nuovo Codice della Strada 287 Regolamento di Attuazione	Coupling devices according to the weight to be towed and the vertical load on the hook. The hook types are as follows: Type / Trailed weight ≤/ Vertical load ≤ A / 6.000 kg / 0 kg; A1/ 3.000 kg / 250 kg; B / 6.000 kg / 500 kg; C / 6.000 kg / 1.500 kg; D / 12.000 kg / 0 kg; D1 / 20.000 kg / 0 kg; D2 / 14.000 kg / 2.000 kg; D3 / 20.000 kg / 2.500 kg	http://www.aci.it/i-servizi/normative/codice-della-strada/titolo-iii-dei-veicoli/art-106-norme-costruttive-e-dispositivi-di-equipaggiamento-delle-macchine-agricole.html
Environmental Protection	Noise Emissions			
	Engine Exhaust Emissions			

Legislative overview of technical requirements for NRMM in Germany

Category	Technical Requirement	Legislation	Brief description of requirement	Weblink to the legislation
Vehicle Performance & Control	Steering			
	Braking	StVZO § 41	depends on number of axles and speed	http://www.gesetze-im-internet.de/stvzo_2012/BJNR067910012.html
	Max. Speed			
	Speedometer			
Vehicle Dimensions	Max. Weight			
	Max. Length	StVZO § 32	12m	http://www.gesetze-im-internet.de/stvzo_2012/BJNR067910012.html
	Max. Width	StVZO § 32	3m	http://www.gesetze-im-internet.de/stvzo_2012/BJNR067910012.html
	max. height	StVZO § 32	4m	http://www.gesetze-im-internet.de/stvzo_2012/BJNR067910012.html
Road Surface Protection	Max. Axle Loading	StVZO § 34	depending on the number of axles, up to 40 tons	http://www.gesetze-im-internet.de/stvzo_2012/BJNR067910012.html
	Max. Surface Contact Pressure			
	Requirements for Tracked Vehicles			
Vehicle Awareness	Lighting			
	Signalling	StVZO § 49a	no specific lighting requirements apart from normal direction indicators (yellow); speed signs at back, left and right	http://www.gesetze-im-internet.de/stvzo_2012/BJNR067910012.html
	Reflectors			
	(Rotating) Warning Beacons			
Vehicle Markings	Registration Plate		if faster than 20 km/h need to be registered; green registration plate	http://www.kfz-auskunft.de/autokennzeichen/autokennzeichen.html
	Max. Speed Marking			
	Warnings to Other Road Users			

Category	Technical Requirement	Legislation	Brief description of requirement	Weblink to the legislation
	Other Plates / Markings			
Operator Vision	Operator Field of Vision			
	Mirrors			
	Windscreen Wipers & Washers			
	Cabin Glazing			
Operator Environment / Protection	Cabin Seat, Door, Heating/Ventilation			
	Operator Seat Belt			
	Vehicle Roll-Over Protection			
Vehicle Design	Tyres and/or Tyre Rims			
	Fenders / Mudguards			
	Fuel Tank / Cap			
	Mechanical (towing) Couplings	StVZO § 43	need to follow normal standards	http://www.gesetze-im-internet.de/stvzo_2012/BJNR067910012.html
Environmental Protection	Noise Emissions			
	Engine Exhaust Emissions			

ANNEX III: Quantification of costs

ANNEX III.1: General approach towards direct costs quantification

Introduction and key steps

The quantification of direct costs to industry is based on data collected from companies. The data collected is then analysed using the Standard Cost Model methodology to determine the cost of compliance for industry. In addition, an estimate is produced highlighting the cost of compliance with a regulatory proposal harmonising requirements at EU-level.

It is important to note that the approach strongly relies on the quantity and quality of data that was provided by stakeholders. The involvement needed from stakeholders and the overall approach to data collection and analysis includes the following:

1. Review stakeholder feedback via the workshop on the overall approach to data collection and its analysis using the Standard Cost Model;
2. Develop a series of draft survey questions to be reviewed by stakeholders;
3. Implement a pilot survey with 4 companies (leading to the fine-tuning of the survey questions);
4. Implement the survey across a suitable sample and number of companies suggested by stakeholders by requesting firms to initially submit the data needed and subsequently participate in a follow-up telephone interview;
5. Analyse the data collected using the Standard Cost Model and other statistical approaches to arrive at a figure to indicate the current overall cost of regulatory compliance and an estimated sum relating to the cost impact of a harmonised regulatory proposal.

Data needed to perform the Standard Cost Model (SCM) assessment of non-harmonised legislation

The SCM methodology is an activity-based cost measurement of an organisation's regulatory compliance activities. A key strength of the Standard Cost Model is that it is uses a high degree of detail in the measurement of administrative costs by going down to the level of individual compliance activities. The main method of calculation involved is to determine the Price of compliance by multiplying the number of staff hours performed by the relevant hourly staff salary rates. The Price is then multiplied by the Quantity (this latter figure is calculated on the basis of multiplying the frequency of activities by the number of businesses involved). The main data to be collected from companies via the survey are:

- **Staff occupational categories**: The occupation of staff involved in performing compliance activities;
- **Time**: the number of hours (or percentage of staff time) required to complete a specified compliance activity on an annual basis;
- **Frequency of activities**: the number of times the activities have to be performed (annually);
- **Other costs**: the annual costs of any overheads, materials or services that are needed to fulfil the regulatory compliance obligations;
- **Current costs of compliance and estimated cost impact of a harmonised regulatory proposal**: In relation to the data requested above, two sets of figures are needed. The first set relates to the current cost of non-harmonised requirements. The second set relates to estimated figures highlighting the potential cost impact of a harmonised regulatory proposal;
- **Business as Usual (BaU) costs**: The costs that would occur even in absence of any legislation (e.g. safety features provided in any case).

Staff occupational categories and hourly rates

On the basis of survey respondents identifying relevant staff occupational categories involved in the compliance activities, ECORYS identified an appropriate hourly salary rate. The following ISCO (2010) hourly rates were used as a basis:

Table 0.1 Hourly Earnings adjusted to 2010 + Non-wage Labour Costs + 25% Overhead

MS	Hrs worked and paid (Bn)	ISCO 1 Legislators, senior officials and managers	ISCO 2 Professionals	ISCO 3 Technicians and associate professionals	ISCO 4 Clerks	ISCO 5 Service workers and shop and market sales workers	ISCO 6 Skilled agricultural and fishery workers	ISCO 7 Craft and related trades workers	ISCO 8 Plant and machine operators and assemblers	ISCO 9 Elementary occupations	MS Average Hourly Income + WD + NWLC + OH
AT	3.9	57.1	38.4	31.0	24.6	16.9	20.4	20.8	21.5	16.4	**18.8**
BE	3.1	63.1	49.3	32.9	29.3	24.3	25.9	25.8	27.4	22.1	**32.1**
BG	3.2	5.8	3.8	3.2	2.1	1.5	1.6	2.3	2.2	1.5	**2.0**
CY	0.3	45.6	31.3	20.5	13.8	12.3	11.9	17.8	15.2	12.0	**15.3**
CZ	5.5	17.8	11.7	9.6	7.0	5.3	6.7	7.2	6.9	5.0	**6.8**
DE	30.5	57.5	42.5	30.4	27.8	18.8	18.2	24.2	23.6	18.1	**21.6**
DK	2.7	58.1	45.7	38.0	31.6	26.7	30.2	35.9	34.6	28.6	**28.1**
EI	2.1	39.1	41.6	30.2	22.5	18.4	19.5	26.0	21.7	19.1	**22.7**
EL	2.3	33.7	26.3	17.2	14.2	12.5	14.1	16.6	15.5	11.2	**13.3**
ES	16.6	41.8	27.6	21.2	15.2	13.2	14.5	15.7	15.7	12.0	**14.2**
ET	0.7	12.3	8.8	7.1	5.1	4.2	4.4	6.2	5.6	3.5	**5.1**
FI	2.5	52.2	36.1	27.7	23.1	20.0	18.7	25.3	25.0	19.7	**21.5**
FR	21.3	48.5	39.2	28.7	21.5	19.7	19.4	21.7	22.3	18.0	**21.8**
HU	3.8	11.6	8.5	6.2	4.8	3.6	3.3	4.4	4.6	3.3	**4.6**
IT	16.1	59.2	38.9	26.1	22.6	17.9	17.4	17.5	19.0	16.7	**18.7**
LT	1.7	8.5	6.3	4.7	3.9	2.9	2.6	4.3	4.1	2.7	**3.9**
LU	0.4	76.2	50.8	43.2	30.3	22.5	26.6	25.3	26.4	23.1	**27.2**
LV	1.2	7.8	6.3	4.9	3.8	2.7	2.7	3.6	3.6	2.5	**3.5**

MT	0.2	20.0	16.6	12.4	9.7	8.9	9.2	10.0	9.3	8.5	**9.3**
NL	8.1	41.3	35.5	28.7	23.0	19.5	17.4	26.9	25.7	16.9	**20.9**
PL	13.5	18.3	13.0	8.6	6.5	4.5	5.6	6.5	6.6	4.6	**6.9**
PO	4.1	31.6	22.2	14.9	9.4	6.6	5.8	6.5	7.6	6.4	**8.9**
RO	7.4	10.7	6.5	4.4	3.6	2.3	2.1	3.2	3.1	2.1	**3.1**
SE	4.7	51.6	36.8	32.4	25.2	24.6	22.8	27.4	27.2	22.2	**24.1**
SK	2.0	17.4	9.8	8.2	6.2	4.8	4.6	6.3	6.4	4.3	**5.9**
SL	1.0	29.2	19.7	13.3	10.9	8.1	8.0	8.9	8.5	6.6	**9.4**
UK	38.1	40.7	38.2	26.5	17.6	13.5	15.1	21.1	17.5	14.1	**19.4**
EU	**197.13**	**41.5**	**32.1**	**23.2**	**18.2**	**14.3**	**14.7**	**18.1**	**17.4**	**13.7**	**16.9**

The figures are based on the structure of earnings survey and survey on numbers of hours worked and paid, as indicated in the Impact Assessment guidelines.

Time, frequency of activities and other costs

Survey respondents were asked to provide data on the number of staff hours to perform an activity or the share of their annual working time being spent on a specific activity, the annual frequency of the activities performed and the annual cost of any other overheads, materials or services required.

The above data requested needed to be categorised according to regulatory compliance activity areas. The starting structure based on the scoping was the following classification of regulatory compliance activity areas:

Table 2: Regulatory compliance activities linked to non-harmonised legislation

Regulatory compliance activity area	**The following data are required against each of the compliance areas:** **(1) staff categories;** **(2) number of staff hours to perform an activity;** **(3) the annual frequency of the activities performed;** **(4) and the annual cost of any other overheads, materials or services required.** **A non-exclusive list of suggested activities are indicated below:**
Familiarisation with the legislation	• Keeping up to date with and examination of non-harmonised rules • Participating in standardisation meetings / similar • Any other annual costs (e.g. overheads, materials and services)
Type approval / registration / third-party testing costs	• Following specified actions and preparing any documentation • Transportation of the machine to relevant bodies • Following the compliance requests of external bodies e.g. test procedures • Any other annual costs (e.g. overheads, materials and services)
Product design and development activities to meet regulatory requirements	• Any internal work ensuring that product design and development activities are in line with non-harmonised requirements • Any other annual costs (e.g. overheads, materials and services);
Internal product testing to ensure regulatory requirements are met	• Any internal testing activities to ensure that the regulatory requirements are met. • Any other annual costs (e.g. overheads, materials and services)
Administration to meet conformity assessment requirements	• Activities to support aspects of technical files linked to non-harmonised requirements • Activities to prepare certification / declarations linked to non-harmonised requirements • Any other annual costs (e.g. overheads, materials and services)
Manufacturing of safety features or other elements to meet regulatory requirements	• Annual cost of components; • Procurement activities associated with the components; • Overhead costs (e.g. storing the components). • Ensuring machinery is manufactured with the mandated safety features • Any other annual costs (e.g. overheads, materials and services)
Product markings and other product information requirements for users	• Developing and fixing product markings • Developing and fixing warning signs • Preparing and translating instructions • any other administration • Any other annual costs (e.g. overheads, materials and services)
Costs associated with delays in taking a product to market as a result of meeting regulatory requirements	• Annual cost of time delays associated with meeting regulatory requirements
Any other annual or one off costs	• Any other cost aspects not considered above

Regulatory compliance activity area	The following data are required against each of the compliance areas: (1) staff categories; (2) number of staff hours to perform an activity; (3) the annual frequency of the activities performed; (4) and the annual cost of any other overheads, materials or services required. A non-exclusive list of suggested activities are indicated below:
Negative impact on the introduction of innovations	• Any costs associated with not being able to introduce innovations to some countries
Barrier to market entry	• Any costs associated with not being able to introduce innovations to some countries
Business as usual costs	• What percentage of the above activities would be performed anyway in the absence of non-harmonised legislation (i.e. manufacturers are very likely to ensure that machines are designed safely even if there was no regulation).

These were then discussed with the stakeholders during the workshop and refined accordingly.

Cost data linked to current conditions and the cost impact of a harmonised regulatory proposal

Given that a key aim of the study is to quantify the cost impact of a harmonised regulatory proposal, there is a need for survey respondents to provide two main sets of data in line with the request above as follows:

- Current cost of non-harmonised legislation for the road approval of mobile machinery;
- Estimated cost impact of the introduction of harmonised legislation for the road approval of mobile machinery.

Therefore, the survey respondents were asked to provide an estimate on the percentage increase or decrease of direct and indirect costs within a 10 year timeframe if a certain policy option was implemented or not.

ANNEX III.2: The survey questionnaire

Based on the general approach described above, the following survey questionnaire was developed and applied :

‘Study on the EU harmonisation of the requirements for the safe road circulation of mobile machinery’

Survey of Manufacturers

Aim of the Study

ECORYS is undertaking a study for the European Commission examining the regulatory impact of the differences in national legislation relating to the safe road circulation of self-propelled and towed mobile machinery. If the study identifies that the current cost of regulatory compliance is a significant burden to manufacturers, the European Commission may consider that a legislative proposal is necessary at EU-Level, dedicated to harmonising the road safety requirements for mobile machinery with the aim of reducing the administrative burden on manufacturers. The examination of the costs of compliance with national legislation will be performed on the basis of the Standard Cost Model.[53] For this exercise to be successful, the input from manufacturers to the

[53] http://ec.europa.eu/smart-regulation/guidelines/tool_52_en.htm#sdfootnote445sym

survey below is required. *You will be therefore helping the industry and your own firm by taking part in this survey.*

Please note:

- We recognise that the data requested cannot easily be obtained and therefore estimated feedback is appreciated;
- We only require data on the cost of EU Member States' national legislation relating to the safe road circulation of mobile machinery (data relating to countries outside of the EU or other pieces of legislation are out of the scope of this exercise);
- Tractors, trailers and interchangeable towed equipment used for agriculture and forestry that comply with the following piece of legislation are out of scope: Regulation (EU) No 167/2013 on the approval and market surveillance of agricultural and forestry vehicles[54].

The structure and process of the survey

The survey is composed of 12 questions. In contrast to normal phone- or paper/online-based surveys we would like to ask you to first try to go through the document filling in all parts you can answer immediately. This step should help to identify in which areas you need to consult with colleagues or where you have questions to us. It should only take you about 15 minutes. A number of questions seek to obtain estimates. Calculating those might be the most time consuming part of this survey as for some of them you may need to exchange with other staff in your company. We would ask you to provide us then with a first pre-filled questionnaire.

As a follow-up to this written exercise, we are planning to schedule telephone interviews to discuss with you your answers and your concerns in more detail. For that reason we ask in one of the questions whether you agree to be contacted and if so, we kindly ask you to provide your contact details.

Data sought by the survey

The survey seeks data on the cost of compliance with legislation relating to the safe road circulation of self-propelled and towed (only non-agricultural and non-forestry) mobile machinery in the following areas:

- Self-propelled and towed mobile machinery related production data at a company level;
- The current direct cost of compliance with national legislation;
- The current indirect cost of compliance with national legislation;
- The estimated cost of compliance with a harmonised legislative proposal in the context of several possible policy options.

Privacy

ECORYS adheres to the EU's legislation on the protection of personal data (Regulation (EC) 45/2001). Any data collected through this survey will be managed in line with these requirements and will not be shared with third parties. The survey results will thereto be stored in a confidential manner.

The data collected will be aggregated and presented anonymously in the main report. It will be guaranteed that individual answers will not be traceable to the companies interviewed.

Please inform us should your company policy require additional safeguards with regard to compliance. We would be pleased to cooperate on this matter.

Company data

Please indicate your company name and size of firm:

[54] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2013:060:0001:0051:EN:PDF

Table 1.1 Company name and size

Company data	Please insert the information below by providing your company name and indicating the category of firm you represent
Company name	
Please indicate the size of your firm from one of the there categories below: **Large firm**: >250 employees and >€ 50 m turnover or >€ 43 m balance sheet **Medium firm**: <250 employees and <€ 50 m turnover or <€ 43 m balance sheet **Small firm**: <50 employees and <€10 m turnover or <€ 10 m balance sheet	

With regard to the entire range of self-propelled and towed mobile machinery that your company manufactures, that **may comply with Member State road safety legislation** or potentially be used on roads subject to local legislation please indicate the annual number of units sold in the internal market of the EU and their associated annual revenue according to the broad sector categories below.

Please note:

- Include all self-propelled machinery;
- We **only** refer to **towed mobile machinery not for agricultural or forestry purposes**;
- We refer to data for the company **as a whole (in the EU)** and not plant or country units. In case you need to deviate from this delineation to being able to provide data, please make clear what scope you are taking into consideration.

Table 1.2 Broad categories of mobile machinery - units sold annually and annual revenue within the EU

Broad Sector Category of Mobile Machinery Subject to National Road Safety Legisaltion	Number of units sold in the internal market of the EU	Annual Revenue EUR
Agricultural mobile machinery		
Construction mobile machinery		
Municipal mobile machinery		
Gardening mobile machinery		
Other (please explain)		

Regarding the entire range of mobile machinery your company manufactures, please indicate the Member States in the EU where your products are sold by indicating one +, two ++ or three +++ against the relevant countries (the greater the number of +, the higher volume of your company sales to a particular country).

Table 1.3 EU countries where mobile machinery products are sold

Member State	If you sell products to any of the countries below, please insert one +, two ++, or three +++ according to your volume of sales	Member State	If you sell products to any of the countries below, please insert one +, two ++, or three +++ according to your volume of sales
Austria		Italy	
Belgium		Latvia	
Bulgaria		Lithuania	
Croatia		Luxembourg	
Cyprus		Malta	
Czech Republic		Netherlands	
Denmark		Poland	
Estonia		Portugal	
Finland		Romania	
France		Slovakia	
Germany		Slovenia	
Greece		Spain	
Hungary		Sweden	
Ireland		UK	

Direct cost of compliance

Table 1.4 overleaf seeks data on the direct cost of compliance with national legislation on the safe road circulation of mobile machinery. These costs refer to additional costs needed for national homologation compared to product design, manufacturing and sales that would be incurred anyway even if there were no national road safety legislation. The information relates to all EU countries where your company sells relevant products. This specifically corresponds to requirements that must be followed as indicated by the relevant legal texts such as:

- National type approval / third-party testing;
- Product design / development costs;
- Internal company product testing;
- Administration required;
- Manufacturing of safety features;
- Product markings and other information for users.

The data requested relates to the costs of individual compliance areas. In relation to each compliance area, the following information is required:

- The category of employee(s) involved in the compliance areas (please select from A to E from the table below);
- The time (in hours) required to fulfil each individual compliance area;
- The annual frequency of each compliance area i.e. the number of actions per year;
- Any other costs (€) associated with each compliance area (e.g. overheads, services, materials etc.) not specifically related to employee tasks.

Table 1.4 Direct Cost of Compliance of Meeting National Road Safety Requirements for Mobile Machinery

In relation to the categories below, please indicate the number of staff that you employ full time (annually) that are responsible for compliance requirements relating to road approval of mobile machinery.

For example:

- If you employ one category A staff that works part time on compliance requirements for road approval , please indicate **0.5;**
- If you employ three category B staff that work full time on compliance requirements for road approval, please indicate **3.0.**

Broad Sector Category of Mobile Machinery Subject to National Road Safety Legislation	Code	Number of Staff working on compliance issues full time
Homologation Professional	A	
Engineer / Product Designer / Product Tester	B	
Assistant / Administrator	C	
Production Line Manager	D	
Production Line Technician / Floor Worker	E	

Table 1.5 Direct Cost of Compliance of Meeting National Road Safety Requirements for Mobile Machinery (Staff Time)

Please indicate the percentage of time spent annually on compliance requirements for road approval by the staff categories you have indicated above.

For example,

- You may consider that the staff (this could be one or more) you have indicated as corresponding with Code A spend 10 % of their time annually on familiarisation tasks. Please indicate this percentage figure in the relevant cell.

Direct cost of compliance with national legislation on the safe road circulation of mobile machinery **PLEASE PROVIDE ESTIMATED DATA** **Compliance area**	**Please select the relevant category of company employee(s) (A to E)**	**Time (manhours per year AND/OR % of annual staff time)**	**Other costs (out of pocket) – including non-staff costs**
1.) Staff familiarisation with the legislation on national road safety requirements (annual cost) For example, this could include the following tasks or others: • Keeping up to date with national legal requirements in the EU; • Attending national standardisation meetings;	A		
	B		
	C		
	D		
	E		
2.) Type approval body testing / third-party testing to meet national road safety regulatory requirements. For example, this could include the following tasks or others: • *Following specified administrative / documentary requests* • *Following the compliance requests / test procedures of type approval / third party body* • *Other actions (please indicate)*	A		
	B		
	C		
	D		
	E		
3.) Product design / development costs to meet national road safety regulatory requirements	A		
	B		
	C		
	D		
	E		

Direct cost of compliance with national legislation on the safe road circulation of mobile machinery PLEASE PROVIDE ESTIMATED DATA	Please select the relevant category of company employee(s) (A to E)	Time (manhours per year AND/OR % of annual staff time)	Other costs (out of pocket) – including non-staff costs
4.) Internal company product testing to meet national road safety regulatory requirements	A		
	B		
	C		
	D		
	E		
5.) Administration required to meet national road safety regulatory requirements For example, this could include the following tasks or others: • *Developing technical files linked to Member State road safety requirements* • *Preparing certification / declarations linked to Member State road safety requirements* • *Other actions (please indicate)*	A		
	B		
	C		
	D		
	E		
6.) Manufacturing of safety features to meet national road safety regulatory requirements • *Manufacturing of mobile machinery in line with the necessary road safety requirements* • *Other actions (please indicate)*	A		
	B		
	C		
	D		
	E		
7.) Product markings and other information for users to meet national road safety regulatory requirements For example, this could include the following tasks or others: • *Developing and fixing product markings linked to Member State road safety requirements* • *Developing and fixing warning signs linked to Member State road safety requirements* • *Preparing and translating instructions linked to Member State road safety requirements* • *Other actions (please indicate)*	A		
	B		
	C		
	D		
	E		
Cost in the total absence of any national road safety legislation (%) To perform the Standard Cost Model calculation, we need to receive an **estimated percentage**			

Direct cost of compliance with national legislation on the safe road circulation of mobile machinery PLEASE PROVIDE ESTIMATED DATA	Please select the relevant category of company employee(s) (A to E)	Time (manhours per year AND/OR % of annual staff time)	Other costs (out of pocket) – including non-staff costs
figure of the overall costs you have indicated above relating to the 'cost of compliance in the total absence of any national road safety legislation'. This is a **hypothetical scenario** relating to the costs that would be incurred anyway even if there were no national road safety legislation. In this hypothetical scenario, it is very likely that manufacturers would still make their mobile machinery products as safe as possible for their customers. Therefore, what is the estimated cost that would be incurred anyway in the absence of national road safety legislation? For example, you may consider that in the total absence of national legislation, the cost of making mobile machinery safe for the road is: 10 % or 50 % or 90 % etc. of the overall costs you have indicated above.			

Qualitative follow-up on the table above via a telephone interview (direct costs)

In the table above, we have indicated a number of compliance areas that are likely to be followed when complying with national road safety legislation for self-propelled and towed mobile machinery in some or all EU Member States. Via a telephone interview, we would like you to explain the following (feel free to also already pre-fill these answers if you wish):

- The processes that must be followed to ensure that you satisfy the necessary regulatory obligations when placing products on the market in one or more EU Member States?

- What are the main issues problems that are specifically linked to differences in national legislation in relation to each of these processes?

- On a scale of 1 (not burdensome) to 5 (very burdensome), to indicate the relative level of burden linked to each compliance area

- Indicate any other issues that should be considered in the context of regulatory compliance

Indirect costs / hassle costs of compliance

Table 1.6 invites you to provide data on the indirect cost and hassle costs of compliance with national legislation on the safe road circulation of mobile machinery. The information relates to all EU countries where your company sells relevant products.

These costs relate to managerial / hassle consequences that emerge as a result of national legislation (rather than specific compliance requirements indicated in the legislation) or costs which are passed on to other groups e.g. consumers. These include:

- Delays relating to the placing of the product on the market;
- Negative impact on product innovations;
- Barriers to market entry (e.g. deciding not to export to some EU Member States given the significant cost implications of regulatory compliance with road safety requirements);
- Costs that are passed on to consumers as a result of non-harmonised national legislation;

Please provide an estimated figure of the overall annual cost impact of the indirect / hassle costs indicated below.

Table 1.6 Indirect Costs / Hassle Costs of Compliance of Meeting National Road Safety Requirements for Mobile Machinery

Indirect costs associated with national legislation on the safe road circulation of mobile machinery	Please estimate the annual cost impact on your firm EUR
Indirect / Hassle Costs	**Per annum**
Annual Costs associated with delays to market as a result of national road safety regulatory requirements	
Negative impact on product innovations In line with your innovation cycle (e.g. every 4 years) what is the negative cost impact on innovation activities (please indicate in the other costs column	
Barriers to market entry to other EU countries (e.g. cost of deciding not to export to some EU Member States as result of national road safety requirements)	
Costs that are passed on to intermediaries / clients as a result of non-harmonised national legislation	
Other indirect costs (please indicate)	
Cost in the total absence of any national road safety legislation (%) To perform the Standard Cost Model calculation, we need to receive an **estimated percentage figure** of the overall costs you have indicated above relating to the hassle / indirect costs in the total absence of any national road safety legislation'. This is a **hypothetical scenario** relating to the costs that would be incurred anyway even if there where no national road safety legislation. In this hypothetical scenario, it may the case some of the problems indicated above would still exist. Therefore, what is the estimated cost that would be incurred anyway in the absence of national road safety legislation? For example, you may consider that in the total absence of national legislation, the indirect / hassle costs are 10 %, 20 % or 30 % of those indicated above .	

Qualitative follow-up on the table above in a telephone interview (indirect / hassle costs)

Via a telephone interview, we would like you to comment on the indirect / hassle costs you have indicated in the table above. In particular we would be interested in the following (feel free to also already pre-fill these answers if you wish):

- The activities that you have undertaken to address the issues around the indirect / hassle costs?

- What are the main problems that are specifically linked to differences in national legislation in relation to each of these indirect / hassle costs?

- On a scale of 1 (not burdensome) to 5 (very burdensome), please indicate the relative level of burdensomeness linked to each indirect / hassle cost?

- Please indicate any other indirect / hassle factors that should be considered, including those on clients, dealers and other actors in the value chain?

Direct and Indirect Cost Impact of the Policy Options

The final part of the survey seeks to collect data from manufacturers regarding their views on several possible policy options and their impact on both the direct costs and the hassle/indirect costs.

This simply relies upon respondents providing estimated percentage figures as to whether the existing direct and hassle/indirect cost of compliance will increase (+) or decrease (-) (or remain the same) under certain policy scenarios.

Given that the study will only examine the 'building blocks' of certain policy options, we are not in a position to provide further information on the specific technical requirements related to each option. As a result, please make judgements on the impact of these scenarios as you see fit.

Please note: We understand that you will need to **provide rough percentage estimates**.

Policy Option 0: 'Do nothing option':
This policy option is forward looking (**10 year period until 2025**) and seeks to understand what would happen if no action were taken i.e. Member States would still have powers to set their own national road safety legislation for mobile machinery.

As mentioned, no action will be taken by the European Commission under this scenario. You may consider that the situation may improve or become worse without any further action.

> *For example, if you think the situation will get worse over the next 10 years you may wish to indicate the cost impact as **+**10 % or if you think it will get better you may wish to indicate the cost impact as **-**10 %. If there will be no change, then indicate 0 %.*

Please indicate if the costs are likely to increase or decrease (or remain the same) under this option in the coming 10 years (until 2025)?

Table 1.7: Policy Option 0

Policy Option	Impact on Direct Costs %	Impact on Indirect Costs %

Do nothing option	Please indicate + or –	Please indicate + or –

Policy Option 1: 'Mutual recognition regulation for self-propelled and towed mobile machinery'.

Under this scenario, mobile machinery manufactured according to equivalent national rules of one Member State should be recognised as compliant by authorities in other Member States. Please indicate if the costs are likely to increase or decrease (or remain the same) under this option in the coming **10 years (until 2025)**?

Table 1.8: Policy Option 1

Policy Option	Impact on Direct Costs %	Impact on Indirect Costs %
Mutual recognition regulation	Please indicate + or –	Please indicate + or –

Policy Option 2: **'Introduction of 'harmonised legislation for systems/components/separate technical units related to the road circulation of self-propelled and towed mobile machinery'.**

Under this option, the overall approval of the whole vehicle would remain at national level. However, approval of systems/ components/ technical unit regulations would be harmonised at EU-level. For some of the components, certification exists already in other sectors. For the remaining aspects, harmonised regulations will need to be defined. This policy option would be established under the European Commission's New Legislative Framework (as is the case with the Machinery Directive)[55].

In addition, the harmonised regulation for the approval of systems/ components/ technical unit could be established on the basis of three alternative sub-options ('self-certification', 'part self-certification and part third party certification for safety critical components', and 'complete third party certification').

Please indicate if the costs are likely to increase or decrease (or remain the same) under each of the sub-options in the coming **10 years (until 2025)**?

Table 1.9: Policy Option 2

Policy Option	Sub Option	Impact on Direct Costs %	Impact on Indirect Costs %
Harmonised legislation for systems/components/separate technical units for mobile machinery related to road	Self-certification	Please indicate + or –	Please indicate + or –
	Part self-certification and part third party certification for safety critical components	Please indicate + or –	Please indicate + or –

[55] http://ec.europa.eu/growth/single-market/goods/new-legislative-framework/index_en.htm

circulation	Complete third party certification	Please indicate + or –	Please indicate + or –

Policy Option 3: 'Harmonised legislation for the whole approval of self-propelled and towed mobile machinery (including all separate technical units) related to road circulation'.

This policy option would be established under the European Commission's New Legislative Framework (as is the case with the Machinery Directive).[56] According to the three sub-options below, the approval of the whole vehicle would occur through either 'self-certification' or 'part self-certification and part third party certification for safety critical components' or 'complete third party certification'.

Please indicate if the costs are likely to increase or decrease (or remain the same) under each of the sub-options in the coming **10 years (until 2025)**?

Table 1.10: Policy Option 3

Policy Option	Sub Option	Impact on Direct Costs %	Impact on Indirect Costs %
Harmonised legislation for the whole approval of self-propelled and towed mobile machinery (including all separate technical units) related to road circulation'.	Self-certification	Please indicate + or –	Please indicate + or –
	Part self-certification and part third party certification for safety critical components	Please indicate + or –	Please indicate + or –
	Complete third party certification	Please indicate + or –	Please indicate + or –

Policy Option 4: 'EU type approval of self-propelled and towed mobile machinery'.

Under this option, type approval bodies would approve either components or the whole vehicle. The legislation could operate in a similar way as the type approval of agricultural tractors currently. Given that this scenario could not be established under the New Legislative Framework, self-certification would not be available. The two sub options relate to either EU separate system and component type approval or EU Whole vehicle type approval.

Please indicate if the costs are likely to increase or decrease (or remain the same) under each of the sub-options in the coming **10 years (until 2025)**?

Table 1.11: Policy Option 4

Policy Option	Sub Option	Impact on Direct Costs %	Impact on Indirect Costs %

[56] http://ec.europa.eu/growth/single-market/goods/new-legislative-framework/index_en.htm

EU type approval	EU separate system and component type approval or	Please indicate + or –	Please indicate + or –
	EU whole vehicle type approval	Please indicate + or –	Please indicate + or –

By telephone, we would like you to comment on these policy options to explain the rational of your answers and your views on each option.

SURVEY ANNEX - Key Technical Problems and requirements

The study is aiming to identify the key technical problems for manufacturers when dealing with different national legal frameworks for the road safety of self-propelled mobile machinery.

In addition to the quantitative evidence collected above, we would like to collect anecdotal and qualitative evidence from manufacturers linking the difficulties around national requirements for road safety with products manufactured.

Can you please describe three key difficulties that you have experienced when dealing with legislation in another Member State when attempting to ensure compliance with road safety requirements. **Please note that we would possibly use these examples in the final report to explain the problem. Hence do not fill in confidential information here.** Please indicate as follows:

Table: A.1 Description of three key problems for manufacturers

Member State	Product Type	National Road Safety Requirement	Nature of the problem

In the following table (table 15) we would like you to make a brief judgement on how demanding (e.g. technically and/or administratively) requirements are in each of the MS you are active in. Use the scale '+', '++' and '+++'. '+' Means 'not demanding, '++' is 'medium demanding' and '+++' is 'very demanding'. If you want to comment, use the column to the right. If you expect requirements to increase or decrease in a certain Member State, please indicate it in the respective column. Please indicate as follows:

Table: A.2 Assessment of most demanding Member States

Member States	Overall requirements	Comments	Future expectations
AT			
BE			
BG			
CY			
CZ			
DE			
DK			
EE			
ES			
FI			
FR			
EL			
HR			
HU			
IE			
IT			
LT			
LV			
LU			
MT			
NL			
PL			
PT			
RO			
SE			
SI			
SK			
UK			

In the following table (table 14) we would like you to make a brief judgement on how demanding each type of requirements is. Use the scale '+', '++' and '+++'. '+' Means 'not demanding, '++' is 'medium demanding' and '+++' is 'very demanding'. In addition we would like you to judge in the

column to the right if requirements are difficult due to the challenging 'requirement' or due to the difference between Member States. If it is the requirement itself please indicate with an 'R'. If it is the hassle due to differences please indicate an 'H'. Please indicate as follows:

Table: A.3 Assessment of most demanding requirements

Category	Technical Requirement	Overall assessment	Requirement or hassle (put R or H)
Vehicle Performance & Control	Steering		
	Braking		
	Max. Speed		
	Speedometer		
Vehicle Dimensions	Max. Weight		
	Max. Length		
	Max. Width		
Road Surface Protection	Max. Axle Loading		
	Max. Surface Contact Pressure		
	Requirements for Tracked Vehicles		
Vehicle Awareness	Lighting		
	Signalling		
	Reflectors		
	(Rotating) Warning Beacons		
Vehicle Markings	Registration Plate		
	Max. Speed Marking		
	Warnings to Other Road Users		
	Other Plates / Markings		
Operator Vision	Operator Field of Vision		
	Mirrors		
	Windscreen Wipers & Washers		
	Cabin Glazing		
Operator Environment / Protection	Cabin Seat, Door, Heating/Ventilation		
	Operator Seat Belt		
	Vehicle Roll-Over Protection		
Vehicle Design	Tyres and/or Tyre Rims		
	Fenders / Mudguards		

Category	Technical Requirement	Overall assessment	Requirement or hassle (put R or H)
	Fuel Tank / Cap		
	Mechanical (towing) Couplings		

ANNEX III.3: The survey process

ANNEX III.3.1 Survey development

The survey was developed on the basis of the Standard Cost Model (SCM) according to the European Commission Better Regulation guidelines. It was then adapted to the specific needs of the sector. The draft survey was discussed with all stakeholder at the workshop. It was then approved by the European Commission and used in pilot interviews. Based on the pilot interviews some small further adjustments have been made which have been reported in the interim report.

ANNEX III.3.2 Survey process and target

The survey was conducted in two steps:

1. **Piloting phase;**
2. **Survey phase.**

During the first phase four company visits were conducted and further direct feedback gathered from one additional company. The original aim of the survey was to receive inputs from up to 50 companies (incl. pilots).

To approach a well distributed sample a series of survey sample selection criteria were developed. The aim was to have:

- about 2/3 of the companies being part of the agricultural machinery segment, and
- 1/3 of the companies from the construction segment, and
- a 50/50 split SME vs large companies.

Furthermore the aim was to focus particularly on large countries such as Germany, Italy, United Kingdom and France to capture the main production countries.

More than 100 companies were directly approached and all leading European associations advertised the survey amongst their members.

ANNEX III.4: The survey sample

The response rate to the survey based on direct contact was very low. Support from the associations helped to get certain relevant contacts. To increase the response rate further measures were undertaken such as:

- two-step approach of interviews: avoiding to stop the interview due to confidentiality reasons at an early stage, first qualitative interviews were organized;
- visit to the AGRITECHNICA in Hannover;
- further interviews with other stakeholder associations (e.g. rural contractors).

The final sample of interviews which led to quantitative information that could be used for extrapolation purposes is 29. Additional six qualitative interviews were conducted with other manufacturers.

Survey non-response analysis

A crucial element in the quantification of the results is to be able to scale up the assessment of firm level data to the suitable business population. This requires that the appropriate multipliers for the selected business population be used.

Thereto the selected PRODCOM codes were used including the assessment of eligibility as included in Table 1.1.

This use of multipliers (or extrapolation) is however based on the assumption that the results from the sample are similar or at least comparable to the broader population. In order to test this assumption, an analysis of non-response was carried out. This analysis is based on telephone contact with companies and an analysis of their reasons for not willing to participate.

Below the reasons for non response are distinguished between those 1) Neutral; 2) Giving rise to a positive bias; and 3) Giving rise to a negative bias.

Ad 1) Neutral reasons

Not producing (being retailers or simply commercial branches of larger groups located in other countries)

In case such companies are identified, they are incorrectly grouped as manufacturers and hence they give rise to an overestimation of the population.

However, according to this logic, it would also be possible that some producers (for instance those originally only selling) are excluded from the population. Hence, it is concluded that this does not give rise to a bias in the sample.

Not producing relevant products (either already regulated or not road-going);

This reason is quite likely to occur for those product groups that are partially in scope. Companies may fall under the general definition of being a mobile machinery producer from a statistical perspective, but their main product is not part of this group. Therefore they have a limited interest in responding to the survey.

For example, an interview of a French producer of snow removal equipment (part of municipal machinery) led to the conclusion that all equipment produced is mounted on self-propelled trucks, which fall under different legislation. Even though the truck needs to go through single approval procedures after the equipment has been mounted (an activity carried out by the clients themselves), there is no basis for including this activity as it falls outside the scope of the road approval procedure for mobile machinery. In this case, this is reflected in the fact that only 30 % of the PRODCOM code 28221530 (Self-propelled trucks fitted with lifting or handling equipment, non-powered by an electric motor) is considered eligible for inclusion.

Responder does not agree with European harmonisation

One responder (FR) stated that it does not agree with a European harmonisation scheme. The underlying reasons for this are however difficult to grasp. If they are inspired by personal motives of the responder they are likely to be neutral to the study. In case the producer sees advantages in maintaining the current national legislation, it could give particular advantages that would then turn out to be competitive disadvantages for a competitor. Hence neutral.

Language problems

With several French firms, communication was possible only in French. A follow-up by French speaking interviewees led however to a more cooperative approach, and hence there is no ground for linking this reason to a bias.

Time pressures due to parallel legislative processes

Some respondents pointed to time pressures related to an overlap with homologation deadlines. An update of the tractors directive is taking place in January 2016, so some companies are very busy with in preparing all the necessary documents. There is however no reason to assume a bias behind such a reason.

Company policy of not participating in any statistical data collections or surveys.

As the survey requires the release of confidential data, this motive is understandable especially when no relation is made

Ad 2) Giving rise to a positive bias

The Board of Directors has not agreed to fill in the survey

This can be considered a prioritization issue, and it could imply that the road approval does not have a high priority.

No time/ not participating in surveys

Respondent is part of an industry association and has been contacted by them

This is a potentially important bias, as it would lead to a more positive appreciation of the problem amongst the sample than within the population.

Ad 3) Giving rise to a negative bias

Not exporting within the EU overall

We have identified that a large number of smaller companies – especially those in large domestic markets such as France and Germany – do not export. This can be due to the fact that the company is too small or specialized and/or that the domestic market is large enough.

However there are reasons to assume that the barriers to such exports are high, including those related to the approval of road circulation. Hence, exclusion of such companies would give rise to an underrepresentation of the problem – especially with regard to indirect costs.

Not doing the certification process for other countries

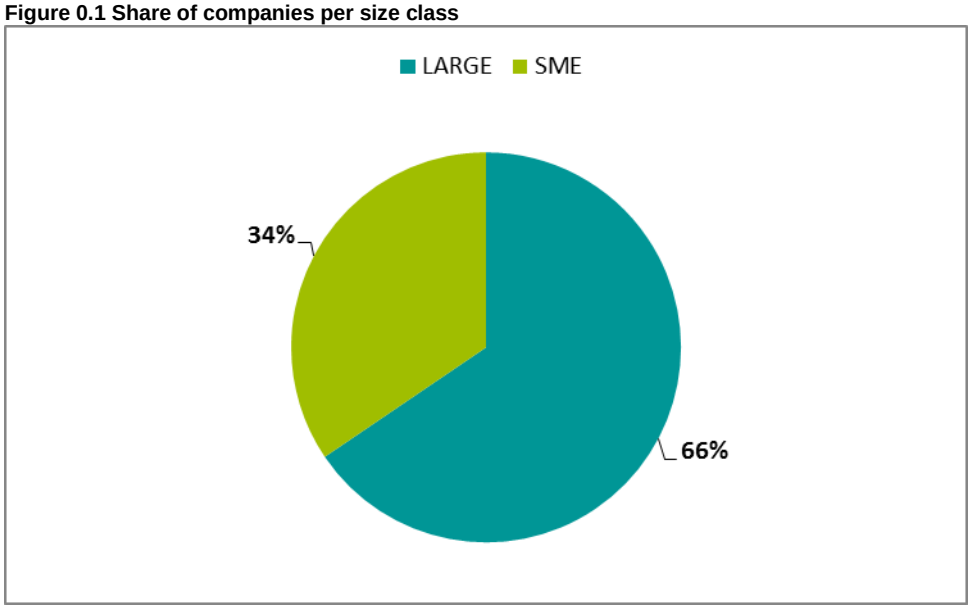
The producer only exports to countries where the home country certificate is accepted or leaves the approval process to local clients/dealers – although they may then need for support from the producer in the form of documentation.

As clients/dealers have not been interviewed, the costs imposed by them are not covered by the sample – hence this leads to an underrepresentation.

Distribution by size class

The original target of a 50/50 split between small and large companies could not be realized due to various reasons including: small companies often only sell on national markets, expanding to other markets costs too much which means no cost data on such expansion exists, burden of participating is high. There are however more than 1/3 of the companies classified as SMEs.

Figure 0.1 Share of companies per size class

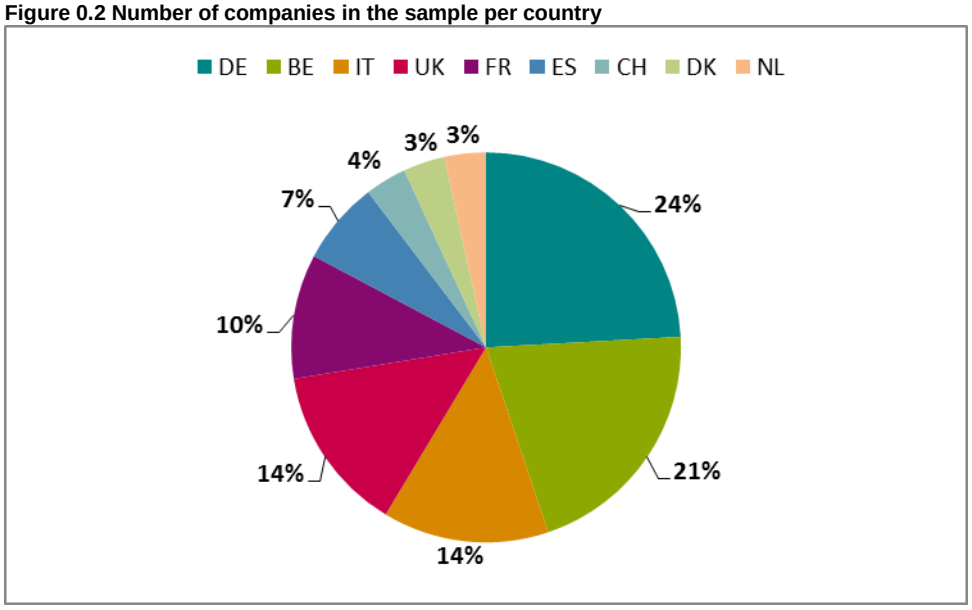


Source: Ecorys survey 2015

Distribution by location

The location of factories is not easy to be assessed given that large companies are often multinationals and their answers reflect their overall presence. Using the location of the respondent to the survey as a proxy provides the distribution of responses for the following nine Member States.

Figure 0.2 Number of companies in the sample per country



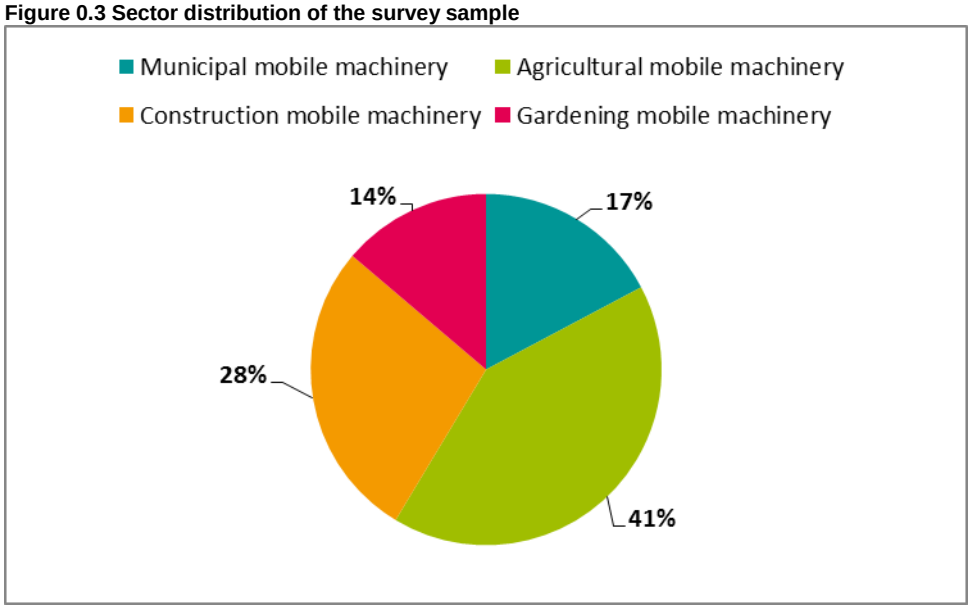
Source: Ecorys survey 2015

Germany as the biggest producing Member State is well represented, while FR, UK and IT could be better represented. BE is slightly overrepresented.

Distribution by sector

Allocating each company to an individual sector is not possible as some of them produce machinery for various sectors. To assess the sector distribution we define each company according to the sector of highest importance (in terms of revenue).

Figure 0.3 Sector distribution of the survey sample



Source: Ecorys survey 2015

Further simplifying the sector allocation by adding gardening and agricultural machinery into "agriculture" and municipal equipment and construction into "construction" shows an almost 50/50 split of participating companies in our survey.

ANNEX III.5. Main challenges and assumptions

When preparing the data set for analysis a series of challenges were observed which had to be overcome through the use of assumptions. In the following the key assumptions are being described.

Difference in reporting and interpretation

Already during the piloting phase we observed that some companies prefer to report in terms of hours per year, while others prefer to report in staff time in percentage. To avoid that companies would skip sections we provided them with the possibility to respond according to their preference. For the analysis we therefore had to translate percentage responses into hours (assuming annual full time working hours).

Another difference observed is that some companies provided a breakdown according to staff categories concerning the business as usual cost while others provided overall estimates. We therefore translated the breakdown into averages for the overall setting.

Particularly concerning the policy options the interpretation of companies based on the options differs. This was visible during phone interviews. We thereby tried to harmonise their views and contacted them again where unclarities remained.

Standard wage and hour rates

Actual wage rates of persons concerned are not available. We therefore made use of the final results of the **hourly earnings survey** from Eurostat from 2010. This survey provides information on hourly earnings for 27 Member States and nine categories of workers.

The categories of workers had to be **matched with our five categories** outlines in the survey. We used the following matching:

Table 0.2 Matching Ecorys survey and ISCO staff categories

Staff category in the survey	ISCO staff categories
A) Homologation Professional	ISCO 2 Professionals
B) Engineer / Product Designer / Product Tester	ISCO 3 Technicians and associate professionals
C) Assistant / Administrator	ISCO 4 Clerks
D) Production Line Manager	ISCO 7 Craft and related trades workers
E) Production Line Technician / Floor Worker	ISCO 8 Plant and machine operators and assemblers

To being able to cover also Croatia and Switzerland we **assumed the same wage rates** as for Slovenia (=Croatia) and Luxembourg (=Switzerland) based on their similar general wage structures.

To calculate annual costs we had to make an assumption concerning the number of hours worked per year. In reality the number of holidays and hourly weeks vary across the EU. We therefore **assumed 45 working weeks with 40 hours of full time work**. This leads to a basis of 1,800 hours worked per full time employee.

Missing data

Not all surveys are 100 % completed. In some cases missing data could be filled through overall averages. This was the case for the "**business as usual costs" where we assumed 25 %** for the missing data cells. 25 % is more or less the average of the answers of other companies.

In other cases a calculation of an average was not possible due to missing data. We therefore made a case by case assessment and where needed excluded specific answers from the sample.

ANNEX III.6: Methodology for extrapolation and the quantification of the policy options

Starting point of the extrapolation is the compilation of the individual company data collected through the survey which was structured according to the Standard Cost Model (SCM) methodology. It thereby requested company information on:

1) **Direct costs of compliance** (familiarisation, type approval/third-party testing, product design, internal testing, administration, manufacturing of safety features, product markings) distinguishing between staff costs and other costs;

2) **Indirect costs of compliance** (delay to market, negative impact, barriers to market entry, costs that are passed on);

3) **Business as Usual (BaU) percentage**: an estimate by the interviewed company to what extent the direct or indirect costs of compliance would also occur in absence of any legislation (e.g. certain safety features would be provided anyway);

4) **Policy options**: the assessed impact on the total direct and indirect costs assuming their hypothetical implementation until the year 2025 (to provide a comparison of annual costs for the year 2025).

Where strong outliers existed further data checks have been made to verify the solidity of the data. In the case of indirect costs, differences in interpretation of the questions were too broad to make solid extrapolations. Therefore, the focus remained on the direct costs. Additional data gaps needed to be filled based on the assumptions outlined above. Furthermore, the answers on staff costs were only provided in either the share of the working time of certain types of staff or in total hours per year. Using the standard wage rates (as shown above) these figures could be translated into annual costs. The outcome of this task is an overview table providing individual cost information for each of the companies (*NOTE: Due to necessary confidentiality agreements with companies to obtain their data, individual company information cannot be presented. Therefore only aggregated data is shown.*) The following table provides an overview of the key data collected.

Table 3 Overview of survey information on direct costs of compliance

Indicators			Firm			Aggregate & Average	
Identification		**Indicator**	**1**	**…**	**29**	**Total**	**Average**
Identifying information from survey		SME/Large Firm	*confidential*	*confidential*	*confidential*	n/a	n/a
		Product Sector	*confidential*	*confidential*	*confidential*	n/a	n/a
		Number of Products Sold Annually	*confidential*	*confidential*	*confidential*	143,595	4,952
		Annual Revenue	*confidential*	*confidential*	*confidential*	5,081,460,564	175,222,778
Direct Costs Information from survey	Familiarisation	Staff costs	*confidential*	*confidential*	*confidential*	1,084,994	37,414
		Other costs	*confidential*	*confidential*	*confidential*	128,725	4,439
	Type approval /third-party testing	Staff costs	*confidential*	*confidential*	*confidential*	2,792,101	96,279
		Other costs	*confidential*	*confidential*	*confidential*	56,150,275	1,936,216
	Product Design	Staff costs	*confidential*	*confidential*	*confidential*	1,403,603	48,400
		Other costs	*confidential*	*confidential*	*confidential*	401,000	13,828
	Internal Testing	Staff costs	*confidential*	*confidential*	*confidential*	1,634,011	56,345
		Other costs	*confidential*	*confidential*	*confidential*	308,300	10,631
	Administration	Staff costs	*confidential*	*confidential*	*confidential*	1,081,216	37,283
		Other costs	*confidential*	*confidential*	*confidential*	16,625	573
	Manufacturing of Safety Features	Staff costs	*confidential*	*confidential*	*confidential*	1,163,958	40,136
		Other costs	*confidential*	*confidential*	*confidential*	1,755,000	60,517
	Product Markings	Staff costs	*confidential*	*confidential*	*confidential*	486,252	16,767
		Other costs	*confidential*	*confidential*	*confidential*	26,200	903
	Business as Usual	%	*confidential*	*confidential*	*confidential*	n/a	27%
Calculations	Total direct costs	**Staff costs**				**9,646,135**	
		Other costs				**58,786,126**	
		Total				**68,432,261**	

	Business as Usual Costs				**25,574,643**	
	Total Direct Costs (Costs less Business as Usual Cost)	*confidential*	*confidential*	*confidential*	**42,857,618**	**1,477,849**
	Revenue Per Unit €	*confidential*	*confidential*	*confidential*	3,371,853	116,271
	Direct Cost of compliance per unit €	*confidential*	*confidential*	*confidential*	20,371	702
	Direct cost of compliance per unit %	*confidential*	*confidential*	*confidential*	19%	1%

Source: Ecorys survey 2015

Extrapolation of individual company costs to the whole population

Having collected individual company information, filled data gaps and translated both, answers concerning working time in hours and percentage of staff hours into annual costs using the standard wage rates, for each company an estimate of staff costs and other costs per compliance activity could be compiled. Adding these up per company and subtracting the Business as Usual costs (according to SCM) provided the direct costs per company to comply with the current regulatory setting (as shown in the table above). The aggregated costs are however only representing the costs of the interviewed sample. To extrapolate the costs from the sample to the whole population we make use of the share of total turnover of the sample divided by the apparent consumption of mobile machinery in the EU (as estimated in Annex I).

$$\frac{\sum respondents\ turnover\ with\ mobile\ machines\ in\ the\ EU}{apparent\ consumption\ of\ mobile\ machines\ in\ the\ EU} = \frac{€5.08bn}{€6.7bn} = 75.8\%$$

This share could then be used to extrapolate to the total population by assuming that each aggregated cost factor represented 75.8% of the costs of the whole population.

$$Costs_{population} = \frac{Costs_{sample}}{0.758}$$

NOTE: BaU costs are not broken down to each compliance category and therefore only deducted from the overall total of direct compliance costs.

The following table provides an overview of the sample and extrapolated direct costs of compliance for mobile machinery manufacturers.

Table 4 Direct costs of compliance per category

	Cost category	Staff/other	Sample	Extrapolation
Direct Costs	**Total Direct Costs (Costs less Business as Usual Cost)**		**42,857,618**	**56,508,565**
	Familiarisation	Staff costs	1,084,994	1,430,585
		Other costs	128,725	169,727
	Type approval /third-party testing	Staff costs	2,792,101	3,681,437
		Other costs	56,150,275	74,035,180
	Product Design	Staff costs	1,403,603	1,850,676
		Other costs	401,000	528,726
	Internal Testing	Staff costs	1,634,011	2,154,473
		Other costs	308,300	406,499
	Administration	Staff costs	1,081,216	1,425,603
		Other costs	16,625	21,921
	Manufacturing of Safety Features	Staff costs	1,163,958	1,534,701
		Other costs	1,755,000	2,314,000
	Product Markings	Staff costs	486,252	641,132
		Other costs	26,200	34,545
	Total direct costs (incl. BaU)		68,432,261	90,229,206

Source: Ecorys survey 2015

Quantifying policy options

For each surveyed company an individual assessment of costs in the current situation is available. In addition each company made an assessment to which extent each of the policy options would change their direct and indirect costs in the year 2025 *(NOTE: The year 2025 was chosen to provide a baseline also for the expected*

cost development in case of no policy action. Cost estimates remain however annual costs.) Using this percentage to extrapolate individual company costs to 2025 was used.

$$(Tot.direct\ company\ cost_x - BaU\ cost_x) * (1 + \Delta\%_{option\ x}) = Excess\ cost\ in\ 2025_{\ policy\ \ option\ x}$$

where Δ% is the expected change of direct costs for the company under a given policy option

To move from the individual costs estimates based on each policy option to the overall sample, the same extrapolation approach was used as for the current cost assessment (extrapolating based on the share of the average turnover of total apparent consumption). This means that the underlying assumption is applied that the market structure remains more or less stable. It needs to be noted that the business usual costa are already deducted from the current compliance costs. This means that only the excess costs are being extrapolated towards the year 2025.

The following table provides an overview on the direct excess compliance cost expected for each of the policy options (for the sample and the total population).

Table 5 Excess cost of compliance under each policy option (for the year 2025)

Policy option	Costs	Sample	Extrapolation
	€Direct Costs now	**42,857,618**	**56,508,565**
Policy Option 0	€Change of Direct Costs	14,250,980	
	€Direct Costs after	**57,108,599**	**75,298,747**
Policy Option 1	€Change of Direct Costs	10,933,861	
	€Direct Costs after	**53,791,480**	**70,925,064**
Policy Option 2.1	€Change of Direct Costs	14,918,448	
	€Direct Costs after	**57,776,066**	**76,178,814**
Policy Option 2.2	€Change of Direct Costs	22,037,164	
	€Direct Costs after	64,894,783	85,564,974
Policy Option 2.3	€Change of Direct Costs	24,381,013	
	€Direct Costs after	**67,238,631**	**88,655,382**
Policy Option 3.1	€Change of Direct Costs	1,037,989	
	€Direct Costs after	**43,895,607**	**57,877,173**
Policy Option 3.2	€Change of Direct Costs	3,115,042	
	€Direct Costs after	**45,972,660**	**60,615,805**
Policy Option 3.3	€Change of Direct Costs	15,877,305	
	€Direct Costs after	**58,734,923**	**77,443,085**
Policy Option 4.1	€Change of Direct Costs	22,146,410	
	€Direct Costs after	**65,004,028**	**85,709,017**
Policy Option 4.2	€Change of Direct Costs	18,881,628	
	€Direct Costs after	**61,739,247**	**81,404,342**

Source: Ecorys survey 2015

Based on the Better Regulation Guidelines the impacts of policy options need to be presented in comparison to policy option 0 ('Do nothing'). To do so, the total compliance costs estimated under the baseline scenario for the year 2025 were deducted from the estimate of a given policy option. The outcome is the difference in compliance costs (= the potential direct cost increase or decrease under a given policy option in comparison to the 'do nothing option'). The following table provides an overview of cost changes of each policy option in relation to policy option 0.

Table 6 Change of direct excess cost of compliance in comparison to policy option 0

Policy option	Change in relation to policy option 0
Policy Option 1	-4,373,683
Policy Option 2.1	880,068
Policy Option 2.2	10,266,228
Policy Option 2.3	13,356,636
Policy Option 3.1	-17,421,574
Policy Option 3.2	-14,682,941
Policy Option 3.3	2,144,339
Policy Option 4.1	10,410,270
Policy Option 4.2	6,105,595

Source: Ecorys survey 2015

ANNEX III.7: Construction of accessibility index

The synthetic indicator used to assess the level of penetration of EU individual markets was derived by the result of the survey of producers of mobile machinery. Each of the subjects interviewed was asked to assign to each EU country a score reflecting the amount of sales of mobile machinery products. The answers ranged from 0 ("no units sold to the specific market") to 3 ("significant number of units sold to the specific market").

Aggregating the data over the sample of producers considered allowed to determine:

- The *intensity of trade* to each EU countries for mobile machinery, by averaging the answers provided by the survey;
- The *level of accessibility* of each EU countries market, by counting the number of producers, which reported a non 0 answer, as a percentage of total respondents.

The results were then refined by splitting the set of respondents to the survey into two subsets, relatively to the firm size. Figures are thus provided for the general sample as well as for SMEs and large companies, respectively. Results are shown in the figure below:

Table 0.3 Accessibility index and intensity of trade relatively to mobile machinery sector in EU countries

	SMEs		Large companies		All	
Country	Intensity of trade	Accessibility index	Intensity of trade	Accessibility index	Intensity of trade	Accessibility index
Austria	1.14	70%	1.53	89.5%	1.42	82.76%
Belgium	2.22	90%	1.80	78.9%	1.96	82.76%
Bulgaria	1.00	30%	1.38	68.4%	1.31	55.17%
Croatia	1.25	40%	1.10	52.6%	1.14	48.28%
Cyprus	1.00	20%	1.00	21.1%	1.00	20.69%
Czech Republic	1.38	80%	1.44	84.2%	1.42	82.76%
Denmark	1.57	70%	1.76	89.5%	1.71	82.76%
Estonia	1.00	20%	1.15	68.4%	1.13	51.72%
Finland	1.29	70%	1.29	73.7%	1.29	72.41%
France	2.33	90%	2.75	84.2%	2.60	86.21%
Germany	2.44	90%	2.89	94.7%	2.74	93.10%
Greece	1.00	20%	1.00	36.8%	1.00	31.03%
Hungary	1.00	40%	1.31	68.4%	1.24	58.62%
Ireland	1.00	60%	1.36	73.7%	1.25	68.97%
Italy	1.43	70%	2.12	89.5%	1.92	82.76%
Latvia	1.00	30%	1.00	57.9%	1.00	48.28%
Lithuania	1.00	30%	1.22	47.4%	1.17	41.38%
Luxembourg	1.20	50%	1.00	47.4%	1.07	48.28%
Malta	1.00	10%	1.25	21.1%	1.20	17.24%
Netherlands	2.10	100%	1.88	84.2%	1.96	89.66%
Poland	1.25	80%	1.67	78.9%	1.52	79.31%
Portugal	1.00	30%	1.10	52.6%	1.08	44.83%
Romania	1.00	60%	1.33	63.2%	1.22	62.07%
Slovakia	1.00	20%	1.08	63.2%	1.07	48.28%
Slovenia	1.00	10%	1.18	57.9%	1.17	41.38%
Spain	1.75	80%	1.81	84.2%	1.79	82.76%
Sweden	1.29	70%	1.81	84.2%	1.65	79.31%
UK	2.10	100%	2.41	89.5%	2.30	93.10%
Average		**54.6%**		**68.0%**		**63.4%**

Source: Ecorys based on Mobile Machinery Sector Survey

The *intensity of trade* parameter may be a weak indicator for the actual level of openness of the national markets of mobile machinery products, as higher scores may be influenced by the size of each market and not only by the lower presence of barriers to entry, i.e. a firm may report an higher number of units sold to a country, if the latter constitutes a bigger market, regardless of the actual extent of regulatory barriers. Disentangling the two components may be problematic. The accessibility index is useful in contains the aforementioned distortion, since it takes into account the presence of the respondents in each markets, and not the amount of sales.

Nevertheless the two indicators display a high level correlation, providing evidence in favour of the robustness of the results. Correlation values are reported in the table below. In bold are the correlation between the two indicators, for each of the three samples considered. The table also indicates the correlations of the results across the three groups. Specifically, correlations of *accessibility indexes* between groups are reported in red. It can be seen that the results for the subsample of SMEs are less correlated with the overall subsample, than the results reported by large companies.

Table 0.4 **Correlations of the parameters, across subsets of respondents**

		SMEs		Large		All	
		Average importance	*Accessibility index*	*Average importance*	*Accessibility index*	*Average importance*	*Accessibility index*
SMEs	*Intensity of trade*	1.000					
	Accessibility index	**0.810**	1.000				
Large	*Intensity of trade*	0.875	0.781	1.000			
	Accessibility index	0.615	0.811	**0.722**	1.000		
All	*Intensity of trade*	0.936	0.803	0.989	0.711	1.000	
	Accessibility index	0.734	0.937	0.785	0.965	**0.788**	1.000

Source: Ecorys based on Mobile Machinery Sector Survey

The *accessibility index* was used to rank the EU 28 countries, which were hence divided into three subgroups. Those countries which reported a results above 75%, were considered to have an high level of penetration, as roughly more than 3/4 of the firms surveyed reported sales for that specific group of markets. Countries having an index of more than 50% were defined has having a medium level of penetration, i.e. at least half of the firms reported to have access to these markets. The remaining countries were defined as markets with limited level of penetration. The results for the ranking, based on the overall sample, as well as the determination of the three groups are displayed in following table.

Table 0.5 **Ranking of EU28 countries according to the level of penetration (survey results) - the two double horizontal bars indicates 75% of firms surveyed and 50%, respectively**

	SMEs		Large companies		All	
Country	**Average importance**	**Accessibility index**	**Average importance**	**Accessibility index**	**Average importance**	**Accessibility index**
Germany	2.44	90%	2.89	95%	2.74	93%
UK	2.10	100%	2.41	89%	2.30	93%
Netherlands	2.10	100%	1.88	84%	1.96	90%
France	2.33	90%	2.75	84%	2.60	86%
Austria	1.14	70%	1.53	89%	1.42	83%
Belgium	2.22	90%	1.80	79%	1.96	83%
Czech Republic	1.38	80%	1.44	84%	1.42	83%
Denmark	1.57	70%	1.76	89%	1.71	83%
Italy	1.43	70%	2.12	89%	1.92	83%
Spain	1.75	80%	1.81	84%	1.79	83%
Poland	1.25	80%	1.67	79%	1.52	79%
Sweden	1.29	70%	1.81	84%	1.65	79%
Finland	1.29	70%	1.29	74%	1.29	72%
Ireland	1.00	60%	1.36	74%	1.25	69%
Romania	1.00	60%	1.33	63%	1.22	62%
Hungary	1.00	40%	1.31	68%	1.24	59%
Bulgaria	1.00	30%	1.38	68%	1.31	55%
Estonia	1.00	20%	1.15	68%	1.13	52%
Croatia	1.25	40%	1.10	53%	1.14	48%
Latvia	1.00	30%	1.00	58%	1.00	48%
Luxembourg	1.20	50%	1.00	47%	1.07	48%
Slovakia	1.00	20%	1.08	63%	1.07	48%
Portugal	1.00	30%	1.10	53%	1.08	45%
Lithuania	1.00	30%	1.22	47%	1.17	41%
Slovenia	1.00	10%	1.18	58%	1.17	41%
Greece	1.00	20%	1.00	37%	1.00	31%
Cyprus	1.00	20%	1.00	21%	1.00	21%
Malta	1.00	10%	1.25	21%	1.20	17%

Source: Ecorys based on Mobile Machinery Sector Survey

The following table displays the amount of countries belonging to the mentioned categories, for each of the three subsamples considered.

Table 0.6 **Grouping of EU28 countries relatively to market access**

Market access			
	Number of countries		
	SMEs	Large companies	All
High level of penetration (>75% of firms surveyed)	8	12	12
Medium level of penetration (between 75% and 50% of firms surveyed)	8	11	6
Limited level of penetration (less than 50% of firms surveyed)	12	5	10

Source: Ecorys based on Mobile Machinery Sector Survey

ANNEX III.8: Further detailed survey outcomes

Table 0.7 **Total and staff costs of compliance for industry**

Compliance activity	Total cost of compliance		Staff cost of compliance	
	€	% of total	€	% of total
Familiarisation	1,600,312	1.8%	1,430,585	11.2%
Type approval /third-party testing	77,716,617	86.1%	3,681,437	28.9%
Product Design	2,379,402	2.6%	1,850,676	14.6%
Internal Testing	2,560,973	2.8%	2,154,473	16.9%
Administration	1,447,524	1.6%	1,425,603	11.2%
Manufacturing of Safety Features	3,848,701	4.3%	1,534,701	12.1%
Product Markings	675,677	0.7%	641,132	5.0%
Total	**90,229,206**	**100%**	**12,718,608**	**100%**

Source: Ecorys based on Mobile Machinery Sector Survey

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