Cost/benefit analysis study for Impact Assessment on road circulation of Non Road Mobile Machinery

Final Report

Written by PPMI Group
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PPMI

EUROPEAN COMMISSION

Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs
Directorate C — Industrial Transformation and Advanced Value Chains
Unit C3 – Advanced Engineering and Manufacturing Systems

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LIST OF ABBREVIATIONS

A&I Accident and Injury

CBA Cost and Benefit Analysis

CE Marking Certification Marking

DoC Declaration of Conformity

DG GROW Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs

DG MOVE Directorate-General for Mobility and Transport

DG SANTE Directorate-General for Health and Food Safety

EC European Commission

EEA European Economic Area

EN European Standard

HS Harmonised Standard

HSA Health and Safety Authority of Ireland

JA Joint Action

MD Machinery Directive

MS Member State

MSA Member State Authorities

NB Notified Body

NRMM Non-Road Mobile Machinery (off-highway equipment)

OTI Finnish Crash Data Institute

PRODCOM Community Production (database)

SME Small and Medium Enterprises

TA Type Approval

TC Technical Committee

EXECUTIVE SUMARY

Previous harmonisation efforts and purpose of the study

Harmonisation of the road safety requirements for mobile machinery in the EU has been an important topic among policymakers and other stakeholders for several decades. The study commissioned by EASME in 2016 confirmed that a lack of harmonised rules for the road circulation of mobile machinery causes direct and indirect costs to economic operators, citizens and Member States, including market delays for new products, obstacles to cross-border activity by distributors and rental companies and road safety concerns in the Member States with less stringent rules.

This study provides an input to the Commission's impact assessment that will accompany a possible new EU legislative proposal aiming to harmonise road safety requirements for mobile machinery. The study builds on the existing evidence, updating, improving and filling in the gaps to measure the possible economic impacts of different harmonisation options. The cost-benefit analysis conducted in this study provided the evidence base for identifying the best policy option, with the largest long-term net benefit for society, including the affected economic operators and EU citizens in all the EU Member States.

The scope of research and its limitations

To assess the costs and benefits of harmonisation, the study team has consulted 90 economic operators, of which 39 are manufacturers of mobile machinery, representing around 50 % of the total industry turnover. The sector was defined based on PRODCOM data which allowed data for the entire EU market to be extrapolated. The findings of this study, therefore, represent the net benefit of harmonisation of the requirements for road circulation throughout the EU.

The study covers all stakeholder groups: manufacturers, intermediaries, end-users, third parties and Member State authorities. It utilises the existing data on road safety and road accidents in the EU. However, the limited availability of the existing data constitutes the main limitation of the study. Overall, the lack of statistics on mobile machinery road accidents combined with expert interviews suggest that such machines do not cause many accidents on public roads. Another limitation stems from many MS authorities finding it very difficult to contemplate the potential costs that harmonisation would bring. Therefore, their survey data must be treated with some caution.

Why is harmonisation needed?

The mobile machinery sector (including manufacturers, intermediaries, end-users and Member State authorities) spends around EUR 6 billion to comply with the non-harmonised requirements for road circulation over a ten-year appraisal period. More than half of this amount (approx. EUR 3 billion) is incurred by the manufacturers and distributors. This means that around 4 % of the industry's revenue goes towards expenses that are necessary to comply with the road circulation requirements, thus reducing its global competitiveness.

Interestingly, the manufacturers' survey results suggest that in the absence of any regulation, manufacturers and distributors would willingly spend less than one per cent of current compliance costs. Thus, the business as usual costs at industry level are estimated at around EUR 20 million.

End-users and rental organisations together incur around EUR 2.4 billion in compliance costs. The study shows, however, that over two thirds of them do not report any costs directly or indirectly associated with the different national regulations. Nevertheless, those that do not report any costs experience indirect effects through higher product prices.

The EU policy options

The harmonisation of the road circulation requirements for mobile machinery would bring different benefits under different policy options. The European Commission has considered the three main policy options (including three sub-options for each) for potential EU harmonisation.

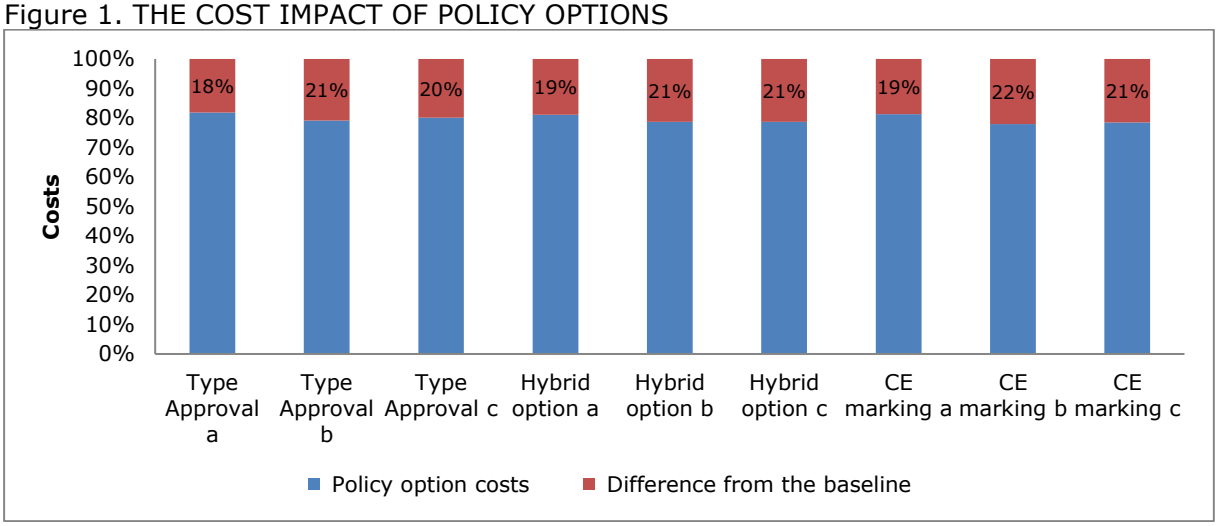
Table 1. THE PROPOSED POLICY OPTIONS

Policy option	Policy sub-option
Type Approval (national authorities grant the approval for the entire mobile machinery)	a. Certification by an authorised third party ("technical service") of each system component and separate technical unit;
	b. Certification by the manufacturer established on technical documentation and self-testing ("in house") of each system/component and separate technical unit;
	c. Mixed sub-option: 1 Certification by an authorised third party ("technical service") of safety critical systems/components and separate technical units; 2 Certification by the manufacturer established on technical documentation and self-testing ("in house") of non-critical systems/components and separate technical units.
Hybrid Approach (national authorities grant the approval for the entire mobile machinery)	a. Certification by an authorised third party ("technical service" or/and notified body") of each system component and separate technical unit;
	b. Certification by the manufacturer established on technical documentation and self-testing ("in house" or/and "self-assessment") of each system/component and separate technical unit;
	c. Mixed sub-option: 1 Certification by an authorised third party ("technical service" or/and notified body") of safety critical systems/components and separate technical units; 2 Certification by the manufacturer established on technical documentation and self-testing ("in house" or/and "self-assessment") of non-critical systems/components and separate technical units.
CE marking	a. CE marking based on certification by an authorised third party (”notified bodies”) of each system/component and separate technical unit;
	b. CE marking based on certification by the manufacturer established on technical documentation and self-testing ("self-assessment") of each system/component and separate technical unit;
	c. CE marking based on: 1 Certification by an authorised third party (”notified bodies”) of safety critical systems/components and separate technical units; (An authorised third party is a notified body). 2-Certification by the manufacturer established on technical documentation and self-testing ("self-assessment") of non-critical systems/components and separate technical units.

Compliance costs could be reduced substantially

The analysis shows that the introduction of harmonised legislation would reduce the costs of compliance by around one fifth, suggesting that a significant cost saving could be achieved through EU action. At the aggregate level, industry could save from 18 % to 22 % of their compliance costs, which roughly translates into EUR 1 to 1.3 billion over a ten-year period.

Figure 1. THE COST IMPACT OF POLICY OPTIONS



Source: analysis by PPMI.

The costs of harmonisation are largely driven by the costs incurred by manufacturers and distributors. It should also be noted that the harmonisation costs for distributors, end-users and rental companies were not found to vary across the different policy options set out in this study. MS authorities is the only stakeholder group that is not expected to face any cost savings from the potential harmonisation. However, in the context of the total costs for the industry their costs are negligible (at around 1% of the total costs) and would have little impact on the overall costs of the potential harmonisation.

The relative advantages of policy options

The study shows that in terms of the net benefit of harmonisation (expressed in EUR), the preferred policy option in the industry is *CE marking*. For the manufacturers it saves the biggest share of costs (relative to the other options) and for the MS authorities it would cost the least to adapt to and maintain. However, the study also shows that a conformity assessment procedure such as this could potentially lead to mobile machinery not being trusted by users.

Type Approval is already well established for different types of vehicles (agricultural and forestry vehicles), therefore the manufacturers and other stakeholders have a good understanding of this policy option. The study shows, however, that this policy option is the costliest for all stakeholders. Manufacturers, and especially SMEs, find the Type Approval system the least beneficial.

Hybrid Approach is a safe option that is favoured by stakeholders and has not received any particular criticism from industry experts. It is worth noting, however, that policy sub-option 'a' might potentially not have any cost effect for manufacturers in Germany. The expected gains from the harmonisation seem to be smaller for German manufacturers as the new system might potentially increase competition in the market. They utilise economies of scale, keeping production costs low and offering competitive prices and therefore selling their production vigorously in all the EU markets. Harmonisation through the reduction of compliance costs would enable smaller and less well-established manufacturers from other EU countries to enter new markets, which may reduce the market share of German producers.

Conclusion: EU action is needed

The study shows that non-EU harmonised road safety requirements for mobile machinery lead to substantial costs for the sector. For manufacturers it not only creates the direct costs of compliance with different regulations, but also leads to barriers to other EU markets and causes market delays that translate into lost revenue. It also increases costs down the supply chain, which in the end become a burden for end-users.

The EU is particularly well placed to address the problem through EU regulatory action. The cost-benefit analysis suggests that the most beneficial policy option is the Hybrid Approach, sub-options 'b' and 'c'. Such potentially new systems would respectively save EUR 1 281 million (under 'b') and EUR 1 286 million (under 'c') for all the EU mobile machinery stakeholders combined.

1. INTRODUCTION

1.1. Data collection effort and validity of the study

The final report includes the following data that have been collected specifically for this study and covers the entire EU mobile machinery market through survey responses, interviews and data extrapolation.

- 90 survey responses were received.
- We have completed 61 interviews.
- Data on costs and benefits have been collected from 21 Member States to extrapolate these figures for the whole EU.
- Data collection has also been undertaken with manufacturers and 39 responses were received from 11 EU MS, covering around 50 % of the non-road mobile machinery (NRMM) market (measured in terms of the value of mobile machinery produced).
- In the data collection exercise, we focused on receiving good quality costs and benefits data and covered different categories of respondents: all five stakeholder groups (manufacturers, intermediaries, end-users, third parties and MS authorities[1]); SMEs and large firms; all sectors in which mobile machinery operates (construction, agriculture, gardening and municipality) and, as mentioned before, 21 different EU Member States. In addition, information from experts of relevant pan-European and national associations has been collected.
- To analyse the data, we completed a cost-benefit analysis, following the methods described in the Better Regulation Toolbox. We sought to ensure that the analysis was both detailed and robust; whenever possible we took into consideration not only the respondent type but also their size, geographical location and other relevant parameters before extrapolating the information and data gathered to an EU level.

Overall, the estimations made in this study are based on information from multiple sources. The primary and most significant source of quantitative information were the surveys of stakeholders. The data were complemented with the qualitative and explanatory information received from the semi-structured interviews with the stakeholders. We have also used publicly available (Eurostat) data to estimate the market size and labour costs. Finally, this study includes relevant information collected in the previous study conducted in 2016[2] and other relevant sources.

1.2. The proposed policy options

The policy options proposed by DG GROW are reviewed in this document. As is typical of these exercises, the performance of the status quo, Baseline, is compared against several pathways that the legislative proposal could follow, Policy Options 1A, 1B and Policy Option 2 and their sub-options, as described further below:

[1] The survey for the last group was administered by the Commission. We provided questions on costs and benefits to be included into the survey.

[2] ECORYS. 2016. "Study on the EU harmonisation of the requirements for the road circulation of mobile machinery". EASME: Brussels. Accessible from https://ec.europa.eu/growth/content/final-report-eu-harmonisation-requirements-road-circulation-mobile-machinery-0_en

- **Baseline** ("*Do Nothing*") relates to the existing different national requirements for road approval and third party testing;
- **Policy Option 1A** (*Type approval*) follows the principles of EU legislation on vehicles. The manufacturer must perform the conformity assessment process. The conformity assessment includes testing of the products and a certificate of conformity. To test the products, the manufacturer should either involve a third party (most of the cases) which is a competent laboratory called a "technical service" or do the testing himself, called "in house" testing for which the approval of national authorities is needed. Moreover, the approval needs to be signed-off by a designated national authority.
- **Policy Option 1B** (*Hybrid approach*) requires the national authorities' approval for the entire mobile machinery and follows the principles of EU legislation on vehicles. Under this system, the safety requirements are embedded in the law but technical details may be found in the related harmonised standards. In this case, third party competent laboratories might be "technical services" (Type Approval system) or "notified bodies" (New Approach system) or both. The manufacturer's testing might be "in house testing" (Type Approval system) or self-assessment (New Approach system) or both possibilities.
- **Policy Option 2** (*CE marking based on the New Legislative Framework)* requires the use of a notified body. Moreover, there is no intervention of the national authorities for EU approval of the entire mobile machinery as the manufacturer will issue a Declaration of Conformity indicating that machinery meets the safety and conformity assessment requirements.

There are also several sub-options that require analysis with a key feature being the extent of the use of an authorised third party, as follows:

- The sub-options for **Policy Option 1A** (*Type approval*) require:
    a) Certification by an authorised third party ("technical service") of each system component and separate technical unit;
    b) Certification by the manufacturer established on technical documentation and self-testing ("in house") of each system/component and separate technical unit;
    c) *Mixed sub-option*: 1 Certification by an authorised third party ("technical service") of safety critical systems/components and separate technical units; 2 Certification by the manufacturer established on technical documentation and self-testing ("in house") of non-critical systems/components and separate technical units.
- The sub-options for **Policy Option 1B** (*Hybrid approach*) require**:**
    a) Certification by an authorised third party ("technical service" or/and notified body") of each system component and separate technical unit;
    b) Certification by the manufacturer established on technical documentation and self-testing ("in house" and/or "self-assessment") of each system/component and separate technical unit;
    c) *Mixed sub-option*: 1 Certification by an authorised third party ("technical service" and/or notified body") of safety critical systems/components and separate technical units; 2 Certification by the manufacturer established on technical documentation and self-testing ("in house" or/and "self-assessment") of non-critical systems/components and separate technical units.
- The sub-options for **Policy Option 2** (*CE marking based on the New Legislative Framework)* require:
    a) CE marking based on certification by an authorised third party ("notified bodies") of each system/component and separate technical unit;

b) CE marking based on certification by the manufacturer established on technical documentation and self-testing (“self-assessment”) of each system/component and separate technical unit;

c) CE marking based on: 1 Certification by an authorised third party (”notified bodies”) of safety critical systems/components and separate technical units; (An authorised third party is a notified body). 2-Certification by the manufacturer established on technical documentation and self-testing (“self-assessment”) of non-critical systems/components and separate technical units.

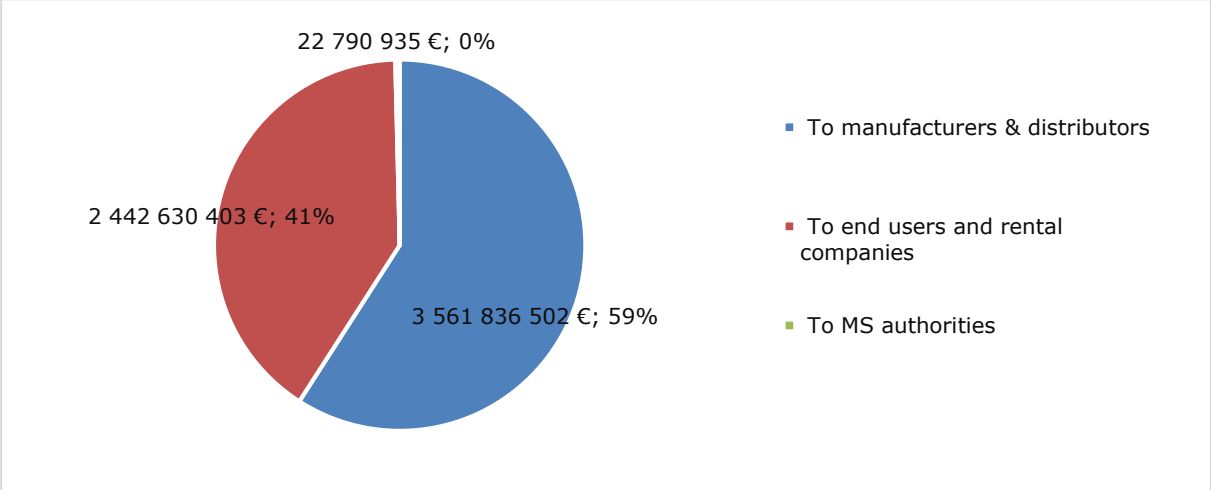
2. COST-BENEFIT ANALYSIS

2.1. Analysis and findings from the CBA of NRMM stakeholders

The following analysis includes the CBA findings from the data representing NRMM manufacturers, distributors, rental companies, end-users and Member State authorities. The aggregated costs and benefits of the proposed policy options are shown in the two figures below.

Under the current system, all stakeholders[3] in the EU incur costs of just **over EUR 6 billion to comply with, and to maintain the road safety requirements for NRMM**. This study estimates the costs for a ten-year appraisal period. The analysis shows that such costs are mainly borne by two stakeholder groups: (1) manufacturers and distributors and (2) end-users and rental companies (see Figure 2). As discussed in the following sections, the main compliance cost driver for manufacturers and distributors are the market delays. Almost all of the end-users claim not to face any compliance costs, while those that incur costs mostly lose earnings from market delays.

Figure 2. BASELINE COSTS SPLIT BETWEEN THREE KEY STAKEHOLDER GROUPS

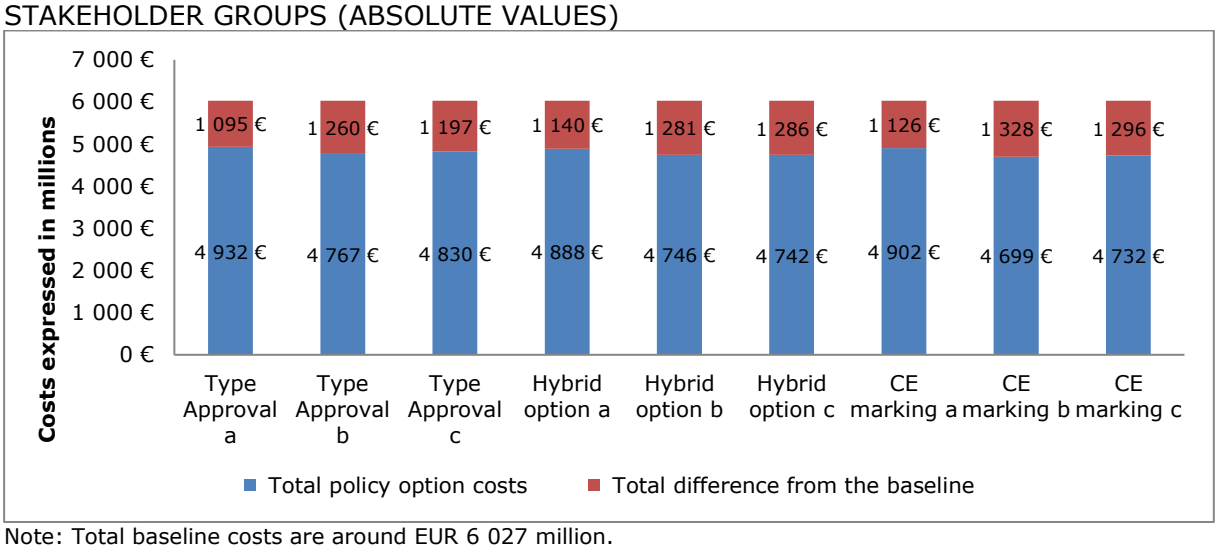


Source: PPMI analysis.

Figure 3 presents the total costs that the NRMM stakeholders would incur under each of the proposed policy sub-options[4]. It also presents the potential savings as a result of harmonisation compared to the baseline situation. Overall, through the introduction of harmonised legislation in this area, **our analysis shows that the costs of compliance could be reduced by around one fifth[5]** (see Figure 4.), suggesting that a significant cost saving could be achieved through the EU action.

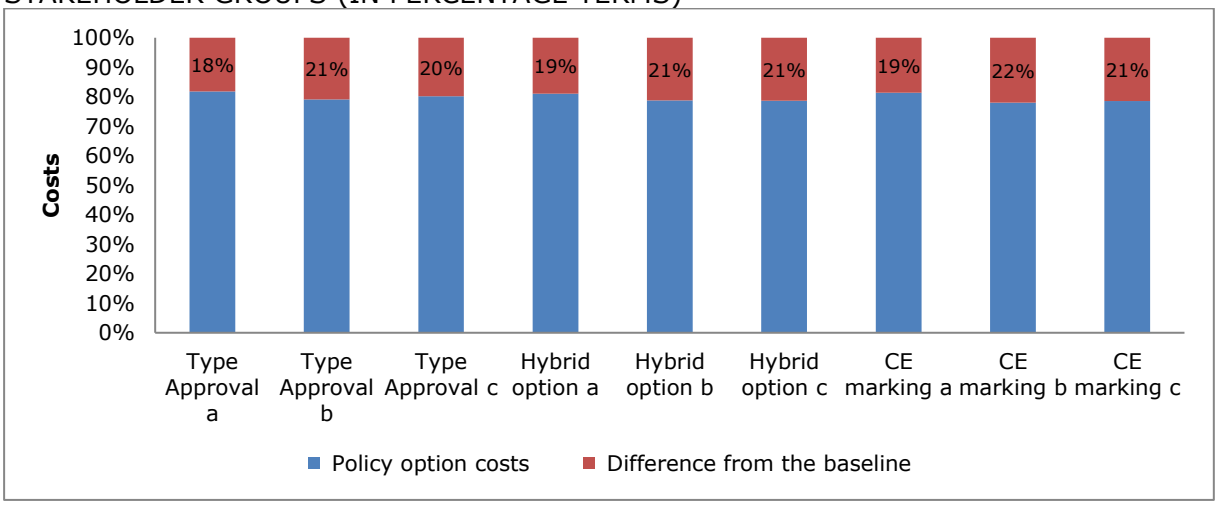
[3] The stakeholders of the NRMM are: manufacturers, intermediaries (rental companies and distributors), end users, Member States' authorities and third-parties (notified bodies and technical services).
[4] Calculations were made with consideration to a ten year-appraisal period.

Figure 3. TOTAL COSTS AND COST SAVINGS FOR ALL POLICY OPTIONS FOR ALL STAKEHOLDER GROUPS (ABSOLUTE VALUES)



Note: Total baseline costs are around EUR 6 027 million.
Source: PPMI analysis.

Figure 4. TOTAL COSTS AND COST SAVINGS FOR ALL POLICY SUB-OPTIONS, FOR ALL STAKEHOLDER GROUPS (IN PERCENTAGE TERMS)



Source: PPMI analysis.

As illustrated in figures 3 and 4 above, the highest cost saving would be expected from the CE marking policy sub-option 'b'. However, when compared with the overall cost savings impact of the different policy sub-options, there are no substantial differences between them, with the estimates suggesting a potential saving of between 18% to 22 % against the baseline costs. These differences suggest that careful consideration of the proposed policy sub-option is required so that the assumed beneficial effects for the internal market can be maximised.

Generally, there are two types of costs: (1) one-off adaptation costs that stakeholders would incur due to the change itself; and (2) potentially changed (direct and indirect) recurring compliance costs. In our analysis we assumed that only manufacturers and Member State authorities can potentially incur any one-off adaptation costs. Under such assumption, even if other stakeholders need to adapt to changes in the system, their costs would be negligible.

Depending on the policy sub-option, the one-off adaptation costs vary from EUR 105 million to EUR 144 million (see Table 2), which makes up to 1 % of the market revenue. Such costs seem to be a small price to pay for the potential benefits of the harmonisation

as the estimated cost savings largely outweigh the adaptation costs (as discussed in the later sections of this study).

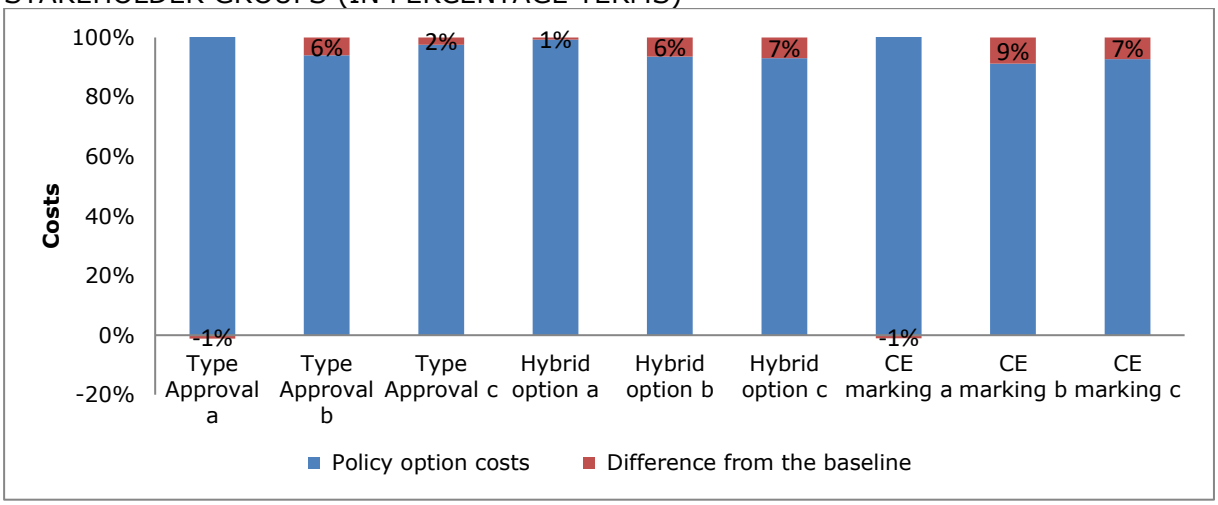
Table 2. ONE-OFF ADAPTATION COSTS, AGGREGATE VALUES

	Type Approval (million)	Hybrid Option (million)	CE marking (million)
Sub-option a	€144	€130	€122
Sub-option b	€123	€108	€105
Sub-option c	€117	€109	€106

Source: PPMI analysis.

Recurring costs, in this analysis are composed of direct and indirect costs. Under the current system the direct costs account for 39 % of all costs, which constitutes around EUR 2.3 billion over the 10-year appraisal period. The potential harmonisation is expected to reduce these costs by only a fraction and varies by proposed policy sub-option (see Figure 5).

Figure 5. DIRECT COSTS AND COST SAVINGS FOR ALL POLICY SUB-OPTIONS, FOR ALL STAKEHOLDER GROUPS (IN PERCENTAGE TERMS)

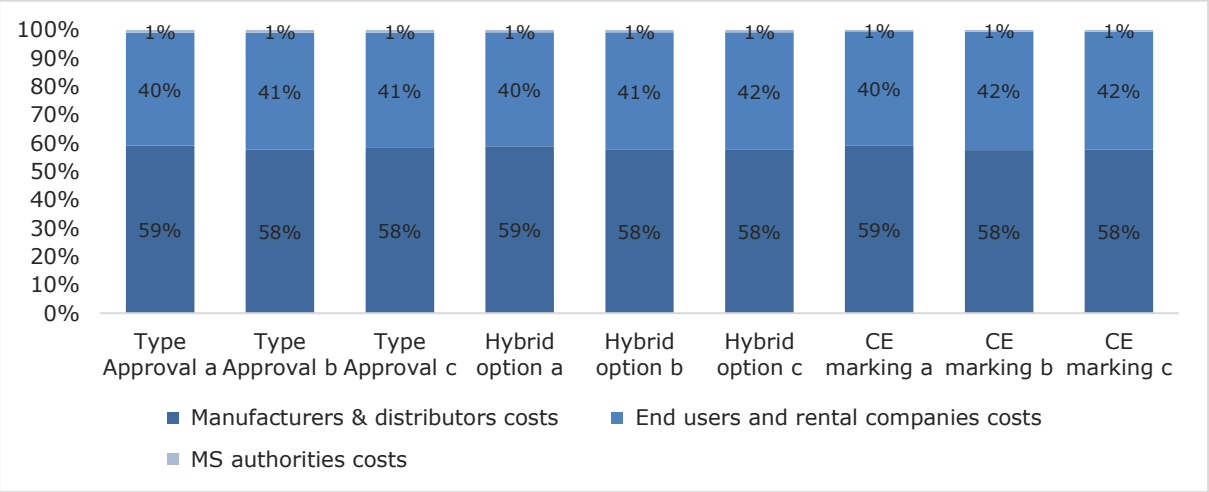


Note: Direct baseline costs are around EUR 2.3 billion.
Source: PPMI analysis.

The harmonisation has a much stronger effect on indirect costs. According to our analysis, the indirect costs can potentially be reduced by 25 % under the harmonised system. This cost saving is constant for every policy sub-option.

The breakdown of these costs by NRMM stakeholder groups shows that **the costs of harmonisation are largely driven by the costs incurred by manufacturers and distributors**. It is also important to note that the harmonisation costs for distributors (that make up a small share of the manufacturers' analysis), end-users and rental companies were not found to vary across the different policy options set out in this study. The costs incurred by MS authorities in the context of the total costs for the whole sector are negligible (around 1 % of total costs) and would have little impact on the overall costs of the potential harmonisation.

Figure 6. THE COMPOSITION OF TOTAL COSTS' DATA



Source: PPMI analysis.

2.2. Analysis and findings from the CBA of manufacturers and distributors

In this sub-section we present the findings from the CBA for the largest NRMM stakeholder group: manufacturers and distributors. The survey gathered data from 39 companies, 30 % of which were SMEs, across 11 EU Member States.

In addition, this dataset includes six survey responses from NRMM distributors. We decided to merge the manufacturers and distributors' survey responses as we learned that manufacturers tend to transfer a part of their compliance activities related to road safety requirements to intermediaries. Hence, generally speaking, both stakeholder groups would incur compliance costs resulting from any differences in NRMM legislation. However, given that the sample size for the distributors was very small, the estimated figures below are driven mainly by the costs incurred by manufacturers.

To support the extrapolation of compliance costs to the market, we relied on PRODCOM data that provided the total production values of the NRMM machinery manufactured in each of the EU Member States.

Box 1. METHODOLOGY OVERVIEW FOR MANUFACTURERS' AND DISTRIBUTORS' CBA

To analyse the costs and benefits for manufacturers and distributors associated with the potential harmonisation of the road safety requirements we have followed these methodological steps:

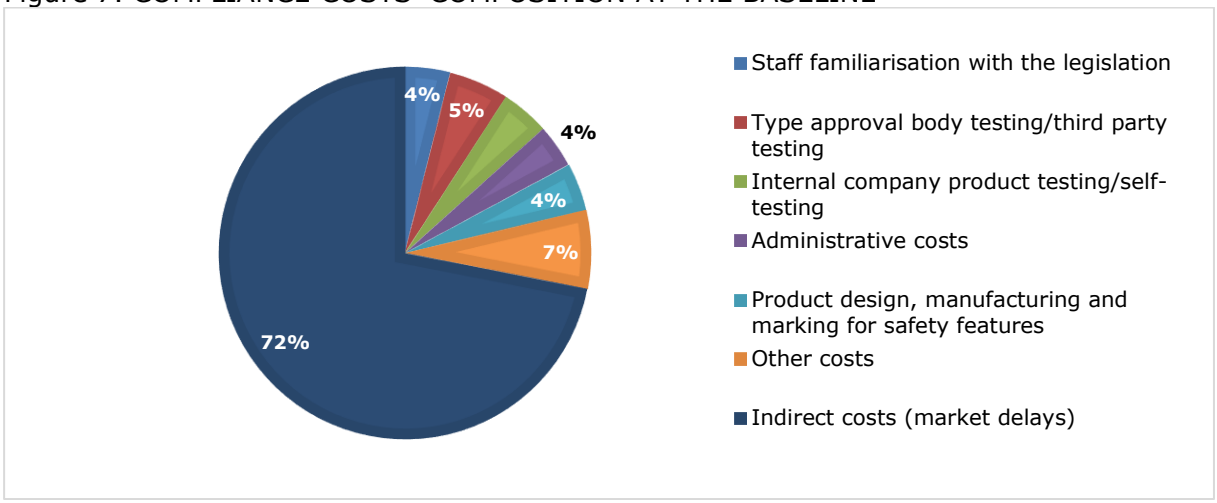
1. **Collected relevant data** through surveys, interviews and other sources available online. The survey has gathered data from 39 manufacturers from 11 EU Member States (MS) and 6 distributors from 5 different MS. The market level data was collected from the Eurostat database.
2. Sample data were analysed at the **baseline**: all direct and indirect costs were added together.
3. Based on the survey data, the **potential costs** were calculated **under each of the policy sub-options**. Note, that due to the study design only direct costs differ by the policy sub-option. Indirect costs (measured though the cost of market delays) are assumed to be constant despite the policy sub-option.
4. The next step was to calculate **the present value** of the compliance costs for each of the survey respondents at the baseline and for all of the policy sub-options. The appraisal period used in the analysis was ten years, and the discount rate used was 4 % as set in the Better Regulations Toolbox.
5. Baseline and potential harmonisation costs were later **extrapolated** to match the whole industry. The extrapolation was based on the total turnover of the NRMM market in the EU (PRODCOM data).
6. The extrapolated costs over a ten-year appraisal period are presented in this study.

2.2.1. Total costs and total cost savings of the NRMM manufacturers and distributors

EU manufacturers and distributors are presently incurring costs of approximately **EUR 3 561 million to comply with the current safety requirements for the road circulation of NRMM** and to obtain the necessary certification and approvals as defined in national legislation set by the Member States. Such compliance costs account for 4 % of the industry's revenue. It includes both direct and indirect costs[6]. In this analysis, the total estimated compliance costs of EUR 3 561 million covers the whole EU NRMM market over a ten-year appraisal period.

In the figure below we present the breakdown of costs that manufacturers currently incur due to the non-harmonised system. In this study the compliance costs were separated into direct[7] and indirect[8]. The analysis indicates that under the baseline, the compliance cost burden comes from the costs that manufacturers incur indirectly, due to the experienced market delays. During the interviews with the manufacturers we learned that market delays occur when a manufacturer has to modify machinery to comply with the regulations in other countries. They can also face delays while waiting for national approvals once they reach another EU Member State. Other costs that are directly experienced due to the differences in national legislation are less burdensome. Together such direct costs account for 28 % of total compliance costs at the baseline.

Figure 7. COMPLIANCE COSTS' COMPOSITION AT THE BASELINE



Source: PPMI analysis.

The baseline figures complement the findings of a similar study conducted in 2016[9]. According to the analysis conducted by Ecorys (published in 2016), the total compliance costs for manufacturers account for EUR 1.5 billion. Our analysis was building on these figures but amending ECORYS methodology to better represent market composition. The main difference between figures in this study and the previous one lies in the methodological approach to extrapolation of the sample. We have chosen a tailored approach to capture the different capacities of EU Member States, while the previous study looked at the EU as a whole. Another major difference in these studies is the sample itself. First, the current study has received more survey responses. Second, the data collection process included more detailed questions to the manufacturers and NRMM distributors. These features improved the precision of the analysis and produced more reliable

[6]These are direct and indirect compliance costs. Direct costs comprise recurring and one-off adaptation costs. Recurring costs are the following: staff familiarisation with the legislation costs, type approval body testing/third-party testing costs, internal company product testing/self-testing costs, administrative requirements, product design, manufacturing and marking for safety features and other costs. Indirect costs in this study are measured by the costs incurred due to the market delays.

[7] These costs are made up of staff familiarisation with the legislation; type approval body testing/third party testing; Internal company testing/self-testing; Administrative requirements; Product design, manufacturing and marking for safety features; and other costs.

[8] The indirect costs were measured by the costs incurred due to market delays.

[9] ECORYS. 2016. "Study on the EU harmonisation of the requirements for the road circulation of mobile machinery". EASME: Brussels. Accessible from https://ec.europa.eu/growth/content/final-report-eu-harmonisation-requirements-road-circulation-mobile-machinery-0_en

conclusions. Despite these methodological differences, both studies found that the most important driver of the compliance costs is the market delays that manufacturers (and distributors) incur due to differences in the legislation of the EU Member States.

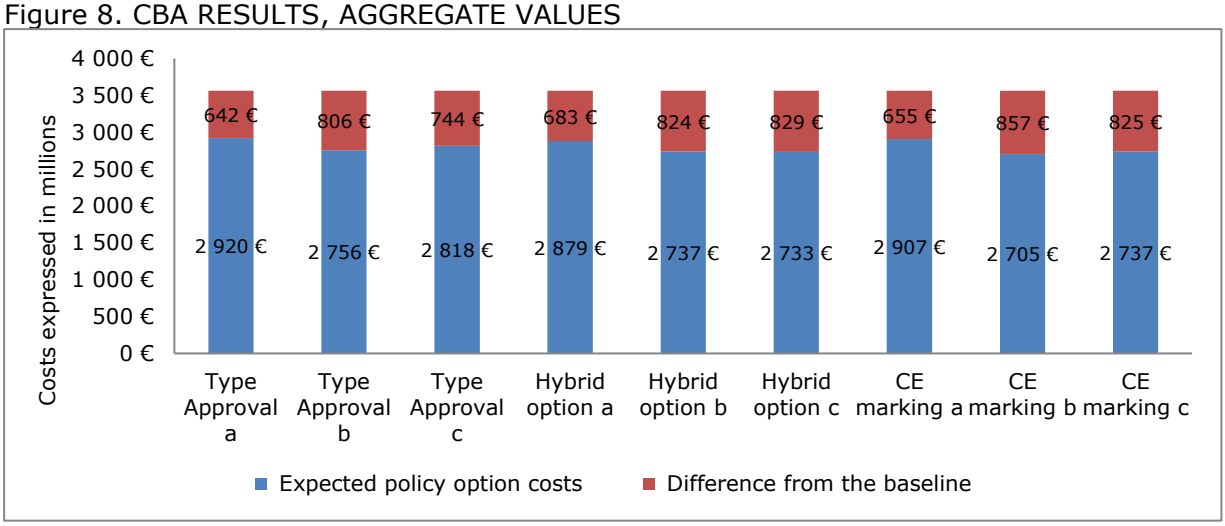
Overall, through the introduction of harmonised legislation in this area, **our analysis suggests that the costs of compliance could be reduced by around one fifth**, suggesting that a significant cost saving could be achieved through EU policy action.

When comparing the estimated impact on cost savings of the different policy sub-options, there are no major differences between them, with a potential saving of between 18 % and 24 % against the baseline costs. However, these differences suggest that careful consideration of the proposed policy sub-option is required so that the assumed beneficial effects for the internal market can be maximised.

As discussed above, the major driver of compliance costs is market delays. Most of manufacturers and distributors expect reduced delays under the harmonised system. However, none of the survey respondents believe that the delays will be cut out completely. Despite the common rules and regulations in the EU, the manufacturers and distributors expect that some administrative and technical requirements will remain.

As illustrated by Figure 8., as might be expected, policy options that require greater involvement of third party bodies (sub-options 'a') would result in higher costs compared to other options that provide more independence to the manufacturer to manage the compliance procedures without external oversight (sub-options 'b').

Figure 8. CBA RESULTS, AGGREGATE VALUES



Source: PPMI analysis.

From the perspective of manufacturers, the most expensive policy option is the 'traditional' Type Approval policy option (especially sub-option 'a'), where a manufacturer or a distributor must obtain certification from an authorised, and normally public sector associated, third party (i.e. a 'technical service') for each component and separate technical unit. The manufacturers interviewed based this judgement on their experience in implementing Regulation 167/2013 on the approval of agricultural and forestry vehicles, suggesting that this form of 'traditional' Type Approval requires a lot of effort and is quite costly. This trend is somewhat in line with the findings of the 2016 study[10]. The manufacturers who participated in that study found the EU Type Approval proposed policy option (and corresponding sub-options) among the least beneficial, and therefore the most expensive for the industry.

[10] ECORYS. 2016. "Study on the EU harmonisation of the requirements for the road circulation of mobile machinery". EASME: Brussels. Accessible from https://ec.europa.eu/growth/content/final-report-eu-harmonisation-requirements-road-circulation-mobile-machinery-0_en

As a further illustration, the manufacturers' feedback stressed the extent of the administrative costs and burdens involved in undertaking a 'traditional' Type Approval procedure. One large manufacturer in Sweden explained that whereas tractors generally are fairly similar, there are thousands of different specialised mobile machines that are engineered to perform specific functions. Therefore, among other things, under a 'traditional' Type Approval procedure, the testing of each component and separate technical unit would be unnecessarily complex and would result in a major administrative burden for industry given the associated documentation requirements.

It appeared, however, that providing flexibility to manufacturers to opt-out of third party testing procedures would not necessarily reduce the costs of compliance significantly, as manufacturers were worried about the possible impact on their future sales if they did not demonstrate compliance without third party 'sign-off'. Thus, if manufacturers were given the flexibility to independently manage the conformity assessment process, many would likely continue to use third party testing services to reduce any end-user concerns regarding product safety.

Interviews with industry players confirmed the impression that consumers and authorities abroad accept mobile machinery more easily if a third party has been part of the process. Several manufacturers did not prefer the self-testing sub-option under either the Type Approval, Hybrid or CE marking procedures, stating that it would result in reputational costs. Sub-option 'c', on the other hand, provides some flexibility, as companies can choose to enhance the trustworthiness of their products through the involvement of a third party or alternatively perform self-testing.

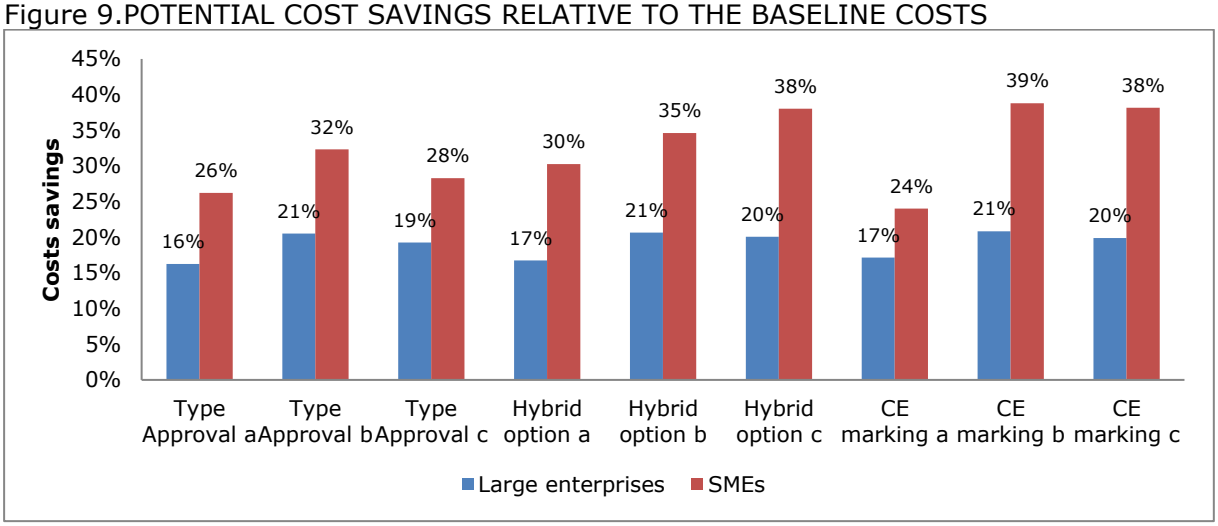
2.2.2. Costs and cost savings for large NRMM firms and SMEs

The analysis showed **that the overall compliance costs for all large firms in the NRMM sector in the EU constituted about EUR 2 923 million** over the ten-year appraisal period (which is around 4 % of the overall turnover of large firms in the industry). Moreover, **the compliance costs for all SMEs in the industry were estimated at EUR 637 million** over the ten-year appraisal period (accounting for 3.5 % of the SMEs' in NRMM revenues).

A comparison of the expected proportional cost savings between large NRMM enterprises and SMEs shows that SMEs would benefit more from harmonisation. Although in absolute numbers, the impact on cost savings of the potential harmonisation for SMEs is very small when compared to large firms considering that SMEs account for a smaller proportion (approx. 18 %) of production in the NRMM market compared with their larger counterparts. The rationale for taking EU action in order to benefit SMEs appears to be substantiated by our analysis.

Figure 9 below shows that relative to the baseline costs, SMEs would potentially save a substantial share of their compliance costs, with the most beneficial options for SMEs being the Hybrid policy option (sub-option 'c') and CE marking policy option (sub-options 'b' and 'c') which provide some flexibility regarding the involvement of third parties. Interestingly, in comparison, large manufacturers do not expect such major differences in terms of the potential benefits from the proposed sub-options.

Figure 9.POTENTIAL COST SAVINGS RELATIVE TO THE BASELINE COSTS



Source: PPMI analysis.

In some respects, the extent of the harmonisation benefits for SMEs is slightly surprising because for many companies in this firm size category, the direct costs of compliance may not change dramatically. Many SMEs may not invest in in house conformity assessment systems given the extent of investment required, meaning that they will continue to outsource such services to third party testing and certification bodies.

However, a key benefit of harmonisation to SMEs is the indirect cost reduction resulting from the expected reduced time delays to cross-border markets that currently characterise the baseline situation. Moreover, a harmonised system will likely open up new national market opportunities for some SMEs because of the reduction in legal obstacles, suggesting internal market scaling-up effects for such enterprises.

Figure 9 above illustrates that SMEs may face substantially different cost effects, depending on the proposed harmonisation policy sub-option. While, as discussed above, an expected reduction of market delays plays a major role in the potential cost savings, the variation in the potential gains is mostly affected by the expected change in direct costs[11]. More importantly, direct costs, under certain options (i.e. Type approval sub-options 'a' and 'c'; Hybrid option 'a'; CE marking 'a'), are expected to outweigh the direct costs under the baseline.

To illustrate the point made above and the importance of the assumed impact of the reduction of time delays associated with the proposed harmonised framework, we have analysed the direct costs of the sub-options against the baseline only, as indicated by Figure 10. For this purpose, we have eliminated market delays from the analysis[12].

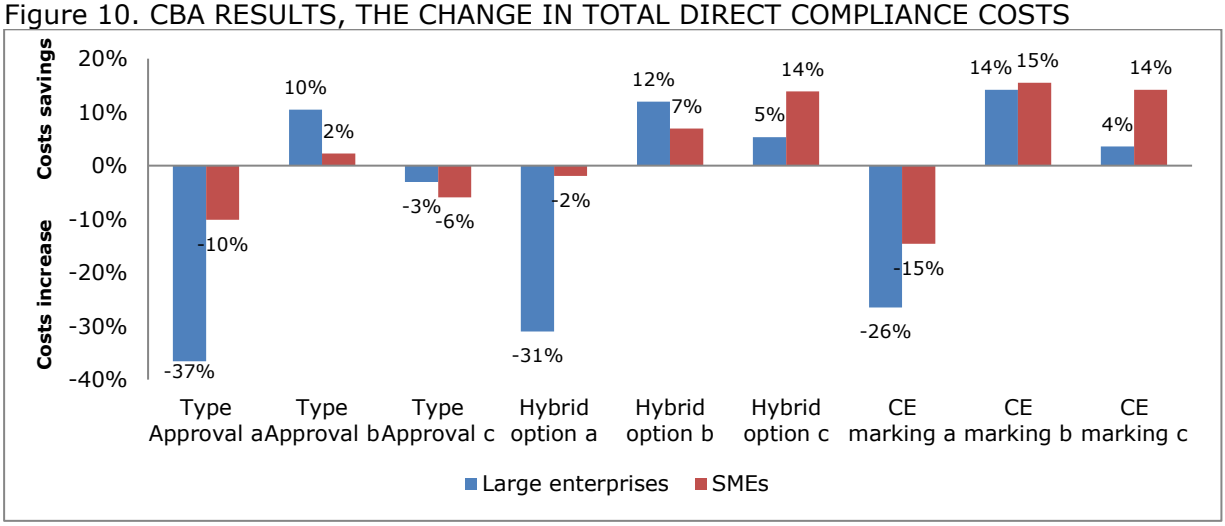
As shown, indirect costs such as reductions in delays to the market are very closely linked to the benefits of potential harmonisation. Cost savings would mostly be driven by the expected decrease in market delays and costs associated with them. Figure 10 illustrates the potential change in costs of harmonisation by only accounting for the direct costs (direct recurring costs and one-off policy adaptation costs). This shows that under all policy sub-options 'a' and Type Approval sub-option 'c' the potential harmonisation will create higher direct costs than direct benefits[13]. For example, an average manufacturer will incur 37 % higher direct costs under Type Approval policy sub-option 'a' compared to the

[11] Note that such observation is also affected by the design of the survey questionnaire. The respondents were not asked to differentiate the potential effects of harmonisation on indirect costs by each policy option. Rather they have indicated the expected effect of harmonisation in general.
[12] Note that market delay costs are relevant components of compliance costs and this step in the analysis was made only for illustration purposes

[13] Under the ten-year appraisal period.

baseline. It is important to note that we have measured only the overall reduction in delays irrespective of harmonisation option[14]. Therefore, the variation in overall costs and benefits of harmonisation is driven by the potentially different direct and one-off adaptation costs (that are shown in Figure 10 below).

Figure 10. CBA RESULTS, THE CHANGE IN TOTAL DIRECT COMPLIANCE COSTS



Source: PPMI analysis.

It was clarified that one of the key causes of time delays stems from the way in which the market currently manages the differences in national legislation for NRMM. Market delays can originate simply from the need to perform multiple procedures, for instance performing conformity assessment in several countries, storing production and waiting times before being able to export products. Such barriers to trade in the non-harmonised NRMM market have deterred some manufacturers from entering some national markets. Manufacturers that sell their products in their domestic market and in some EU countries may not necessarily be prepared to go through the conformity assessment procedure in every single EU market, and may limit the extent of their intra-EU internationalisation activities. In many cases, since the manufacturers may not get their products certified and tested to meet national legislative requirements in all countries, the direct compliance costs are instead borne by intermediaries, such as wholesale distributors, who may export their products to other national markets in the EU. Since the direct compliance costs are spread between manufacturers and distributors, the adjustments and homologation efforts are shared by both stakeholder groups.

Manufacturers usually homologate their production by themselves only for those MS that have national legislation in place that is comparable with the applicable legislation in their own domestic market, or only those markets that are strategically important for the manufacturer (e.g. the biggest markets for NRMM such as France, Italy and Germany). Under the current system this leaves manufacturers with smaller than expected direct compliance costs. However, intermediaries take on the role of managing the compliance procedure in instances where the manufacturer does not wish to take on the responsibility, resulting in additional compliance costs for intermediaries, and time delays to market, which also results in costs.

Regarding the area of NRMM compliance, distributors, typically, only deal with ensuring compliance in their own domestic market for the purposes of mobile machinery road circulation approvals. The general expectation prior to the data analysis was that EU harmonisation should cut out any direct compliance costs for the distributors because the whole conformity assessment procedure would be completed by the manufacturer. However, distributors that were involved in this study seem to expect only some slight reduction in their direct compliance costs (usually less than 20 %)[15]. Hence, the benefits

[14] The assumption was made that while harmonisation might have an impact on the overall length of market delays, it would not differ by a proposed policy sub-option.
[15] One respondent even expects a 6 %-20 % increase in the direct compliance costs.

of a harmonised system in our analysis do not outweigh the additional direct costs created by the harmonisation from a distributor perspective.

Generally, distributors incur only a fraction of the compliance costs. As we learned during the interviews, the cost burden is willingly shared between manufacturers and distributors. In many cases the distributors do not technically alter the machinery, but rather complete the necessary paperwork. The general expectation of the distributors is that the harmonisation would potentially reduce only a fraction of the administrative burden.

It was also suggested that the introduction of a harmonised framework could at the same time also increase the costs of compliance in some areas through the introduction of more stringent requirements. Our interviews suggested that manufacturers operating in Member States with less demanding conformity assessment procedures expect the EU-harmonised system to match the strictest systems in Europe and overall this may result in a smaller than expected benefit compared with the baseline situation. For example, a manufacturer from the UK expects that direct compliance costs would increase because the harmonised legislation might lead to more demanding requirements compared with national legislation in some countries, since it would require matching the legislative requirements in countries that have more stringent requirements such as France or Germany. However, manufacturers selling products across the internal market will still incur cost savings given that a harmonised system will likely generate efficiency gains overall.

Finally, the manufacturers' survey data also provided us with some insights as to potential reasons for an increase in direct compliance costs. Over 50 % of survey respondents (23 out of 39) indicated that the Type Approval policy option, sub-option 'a' would result in an increase of their direct compliance costs. Only eight respondents expected their costs to decrease under the same policy sub-option, but only by a small fraction. In addition, survey data suggest that one-off adaptation costs might be higher for the average manufacturer than the fees charged by the third party or other related expenses under the same policy sub-option. The situation with other policy options that are expected to result in an increase in direct costs is very similar.

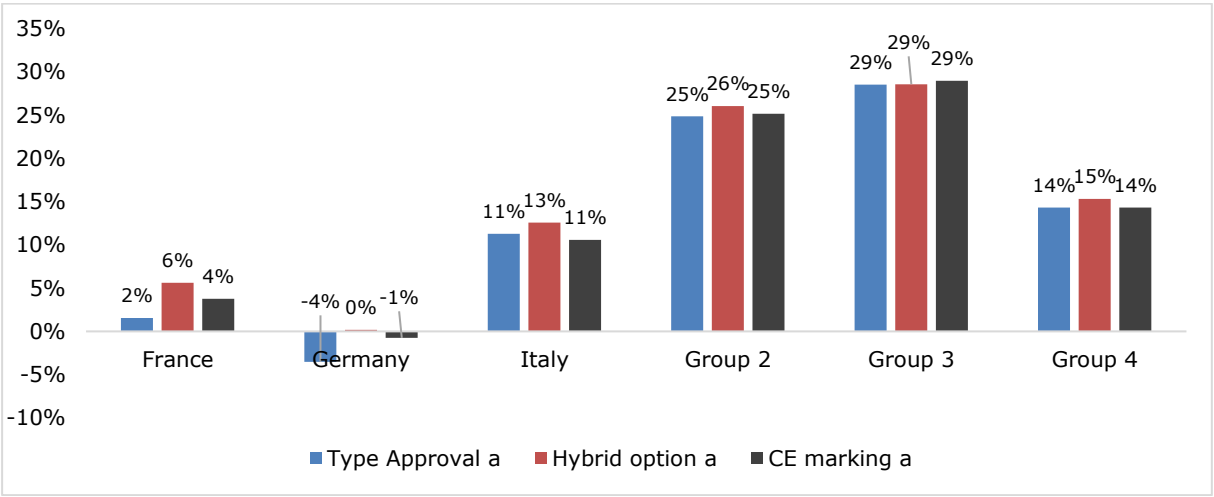
An expected increase in potential costs under the Type Approval policy option, sub-option 'a' was explained by the previous manufacturer's experience with the Type Approval system. The majority of manufacturers have already experienced the regulations of agricultural and forestry vehicles under Regulation 167/2013, which, according to them, made the whole approval process costlier and it now requires more effort than before the regulation. Manufacturers believe that proposed Type Approval policy sub-option 'a' corresponds to Regulation 167/2013.

2.2.3. Costs and cost savings of the NRMM manufacturers by Member State

In line with the preliminary data analysis, the manufacturers and intermediaries in different Member States would face different cost effects of the potential harmonisation of road safety requirements. The least beneficial reductions in the compliance costs are under the policy options that foresee the highest involvement of a third party (policy sub-options 'a': 'certification by an authorised third party of each system/component and separate technical unit'). The figure below illustrates that there could be some cost increases that NRMM manufacturers and intermediaries combined would potentially face in Germany (under all sub-options 'a'). Such an increase in compliance costs in Germany[16] would be mostly felt by large enterprises. Other Member States would mainly experience a positive cost-benefit ratio from the introduction of a harmonised regulatory approach.

[16] One possible reason for this is that the third-party testing is more expensive in Germany, compared to other countries, for example, in Germany a company can pay around EUR 10 000 per year, while in Spain or Luxembourg this amount is much smaller for similar production (EUR 2 500 and EUR 5 000 respectively).

FIGURE 11. POTENTIAL COST SAVINGS BY MS



Note: Country group 2 includes: Austria, Belgium, Finland, Sweden, The UK; Country group 3 includes: Denmark, the Netherlands, and Ireland; Country group 4 consists of: Portugal, Romania, Spain, Czech Republic, Hungary, Poland, Slovakia, Croatia, Estonia, Greece, Latvia, Lithuania, Slovenia, and Bulgaria.[17]
Source: Analysis by PPMI

The compliance costs calculations breakdown by MS is very much linked with the limited survey data availability. The total costs were calculated by grouping countries with a broadly similar regulatory approach. Hence, the potential harmonisation effect is also reported as the same or very similar within each group[18].

Table 3. POTENTIAL COST EFFECT OF THE POLICY OPTIONS

	France	Germany	Italy	Group 2	Group 3	Group 4
Type Approval a	2%	-4%	11%	25%	29%	14%
Type Approval b	14%	11%	14%	35%	29%	15%
Type Approval c	13%	8%	14%	31%	28%	15%
Hybrid option a	6%	0%	13%	26%	29%	15%
Hybrid option b	15%	12%	12%	37%	29%	16%
Hybrid option c	15%	9%	18%	32%	30%	18%
CE marking a	4%	-1%	11%	25%	29%	14%
CE marking b	16%	14%	13%	37%	29%	17%
CE marking c	11%	8%	14%	34%	30%	18%

Note: Country group 2 includes: Austria, Belgium, Finland, Sweden, The UK; Country group 3 includes: Denmark, the Netherlands, and Ireland; Country group 4 consists of: Portugal, Romania, Spain, Czech republic, Hungary, Poland, Slovakia, Croatia, Estonia, Greece, Latvia, Lithuania, Slovenia, and Bulgaria.
Source: PPMI analysis.

As discussed above, Germany is the only Member State that may potentially face negative effects from some of the proposed policy sub-options and indeed would face the least benefit from harmonisation. As discussed in the interviews with the representatives from Spain and Portugal, the current system already favours German manufacturers. It was argued that manufacturers in smaller economies such as those from Portugal and Spain are unable to compete with large manufacturers from Germany, and risk losing contracts due to differences in national regulatory requirements, and the associated costs of entering the market. It should be noted that such effect is external to the conformity assessment system itself. Given the large market size and capacity of German manufacturers, they have a comparative advantage over other players in the market, which in turn, reduces competition.

Harmonisation would potentially open up new markets for manufacturers from smaller economies, thus the benefit for those Member States is much higher than for large

[17] Country grouping was based on the following criteria: NRMM market size, complexity of the conformity assessment and the labour costs. For detailed reasoning behind such MS grouping see the methodology annex.

economies with a significant NRMM market share. For example, countries assigned to groups 2 and 3 (which collectively cover almost 50% of the NRMM manufacturing market) will likely experience the highest level of cost savings (up to 37% of total compliance costs).

Despite all the small variations described above, the manufacturers and distributors seem to be unanimous in their views about the beneficial effects from a potential harmonisation effort. The study participants see the non-harmonised system as a problem, with the differences in national rules being a costly burden to them. They hope that the harmonisation of national NRMM regulations at a European level would reduce the amount of work needed for road approval activities and so reduce the business costs of operating in the internal market. Almost all of them agreed that harmonisation would likely lead to wider economic benefits for industry, for example, through lower compliance costs and increased sales within the internal market.

Generally, the findings from the data analysis and the interviews complement each other. Study participants expect some cost savings if the regulatory system for NRMM were to be harmonised, regardless of the sub-option. Given the associated cost savings, while the manufacturers prefer Hybrid option 'c'[19], they recognise that alternative policy options may need to be considered if other NRMM stakeholders were not to agree to a Hybrid approach.

2.3. Analysis and findings from the CBA of end-users and rental companies

In this sub-section, we present the preliminary findings from the CBA for mobile machinery end-users and rental companies (intermediaries). The survey gathered data from 37 companies, 95 % of which were SMEs, across 11 EU Member States.

This dataset includes 3 survey responses from companies that rent out mobile machinery (1 SME and 2 large companies). We decided to merge the end-users and rental companies survey responses because like the end-users, rental companies experience relatively low compliance costs, as the conformity assessment procedures are largely dealt with earlier on in the supply chain (by manufacturers and distributors). The merging of responses is also supported by the fact that an average baseline cost per unit of mobile machinery incurred by rental companies is similar to the one incurred by the end-users. However, given that the sample size for rental companies was very small, the estimated figures below are driven mainly by the costs incurred by end-users.

To support the extrapolation of compliance costs from the sample of firms to the NRMM market overall, we relied on PRODCOM data that provided the total production volumes of the NRMM machinery manufactured in the EU. This figure provides a maximum estimate of the number of EU-manufactured mobile machinery units that could be used in the EU by rental companies and end-users.

[19] EU approval of the entire mobile machine granted by Member State authorities, certification by an authorised third party ("notified body") of safety critical systems and self-testing ("self-assessment") of non-critical systems.

Box 2. METHODOLOGY OVERVIEW FOR END-USERS' AND RENTAL COMPANIES' CBA

To analyse the costs and benefits for end users and rental companies associated with the potential harmonisation of the road safety requirements we have followed these methodological steps:

1. **Data collection** though surveys, interviews and desk research. Including reviewing the survey answers for their plausibility and logic and filling in missing answers based on the available data and assumptions.
2. Calculation of direct and indirect **baseline and harmonisation costs** for each survey respondent based on the cleaned (and imputed where necessary) survey questionnaire answers.
3. Calculation of total baseline and harmonisation **costs for each survey respondent over a 10-year appraisal period using a recommended 4 % discount rate.**
4. **Calculating total NRMM volumes** in the EU based on PRODCOM market data. Contrary to manufacturers and distributors, there was no market turnover data available, therefore we used production data expressed in units sold.
5. Deriving total baseline and harmonisation costs for each survey respondent **per one unit** of mobile machinery they use/rent. Deriving an average baseline and harmonisation cost per one unit of NRMM **for those respondents whose costs were greater than zero** (about one third of all respondents).
6. **Calculating total baseline and harmonisation cost** to end users and rental companies in the EU, using average cost for the share of respondents whose costs were greater than zero and the number of mobile machinery units used in the EU.

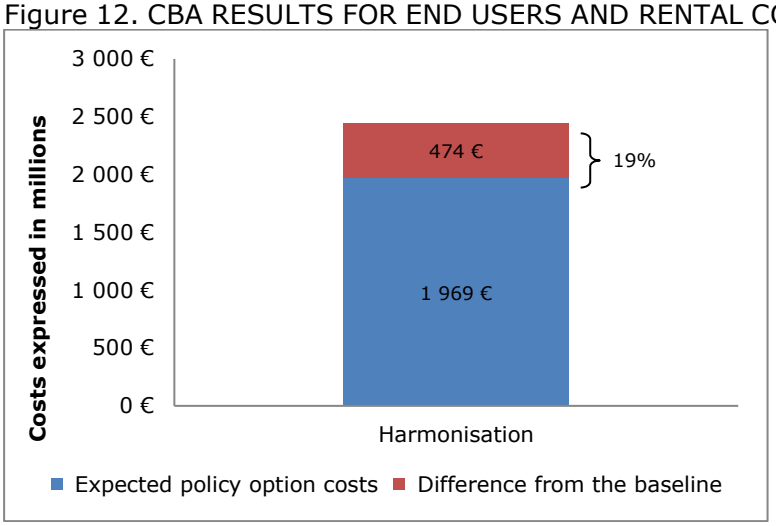
2.3.1. Total costs and total cost savings of the NRMM end-users and rental companies

In total, the EU end-users and rental companies presently incur costs of approximately **EUR 2 442 million to comply with the current safety requirements for the road circulation of NRMM** and to obtain the necessary certification and approvals as defined by national legislation set by the Member States (when this has not been dealt with by manufacturers or distributors). This amount includes both the direct and indirect costs[20]. In this analysis, the total estimated compliance costs of EUR 2 442 million covers the whole EU NRMM market over a 10-year appraisal period.

As shown in Figure 12 **our analysis suggests that the costs of compliance could be reduced by around one fifth** through the introduction of harmonised legislation in this area, suggesting that a significant cost saving could be achieved through EU action to harmonise the market.

[20] The main direct costs experienced by end users relate to the need to modify mobile machinery to meet national road safety requirements if this has not been dealt with by manufacturers or distributors. The main indirect costs for end users stem from lost earnings due to the delay and/or unpredictable delivery of machines. The main direct costs for rental companies stem from: familiarisation with the legislation for the road approval of mobile machinery; technical and administrative procedures that include fixing national vehicle compliance or warning signs to meet national road safety requirements; modifying machinery or sending it back to manufacturers. The main indirect costs experienced by rental companies come from time delays due to having to follow the national road safety requirements for the machinery produced in other EU Member States.

Figure 12. CBA RESULTS FOR END USERS AND RENTAL COMPANIES, AGGREGATE VALUES



Source: PPMI analysis.

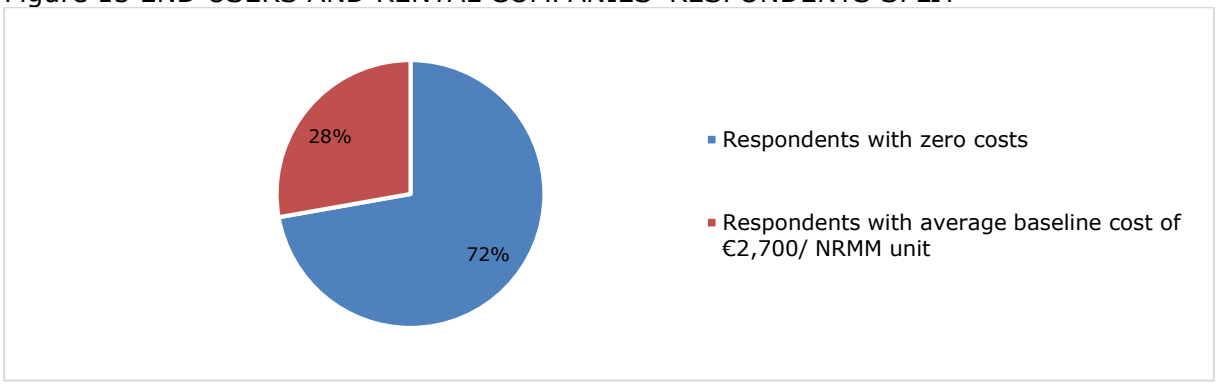
This study did not gather any information about the impacts the different sub-options would have on end-users and rental companies (intermediaries) as these stakeholder groups are at the end of the NRMM supply chain and are not likely to differentiate between the various ways to harmonise the NRMM requirements.

2.3.2. Average costs of the NRMM end-users and rental companies

Most of the surveyed end-users (about two thirds) claimed that they incur no baseline costs. Interviews with end-users and national associations confirmed this finding – end-users are at the end of the NRMM supply chain and in most cases do not have to deal with any conformity assessment issues.

The remaining respondents (about a third), as illustrated by Figure 13, claimed that they would incur some costs associated with NRMM conformity assessment procedures. An average baseline cost per respondent (end-user and rental company) was about EUR 2 700 per unit of mobile machinery[21] (over a 10-year appraisal period), of which around 20 % are incurred directly[22].

Figure 13 END USERS AND RENTAL COMPANIES' RESPONDENTS SPLIT



Source: Analysis by PPMI

The average harmonisation cost for an end-user or rental company was found to be lower than the average baseline cost by around 20 %.

[21] Note that the average baseline cost per respondent is calculate by only including those respondents that reported their compliance costs to be greater than zero.
[22] This includes costs to modify the mobile machinery, to additionally test it, and other tasks that are directly related to the road circulation approval.

The possible costs that would arise from a harmonised system for end-users and rental companies would mainly stem from the need to carry out research and to produce compliance and technical documentation to comply with the new regulations. Most interviewees agreed that the overall impact of harmonisation on their business will be positive and will outweigh the initial costs. The cost reductions expected by manufacturers due to a harmonised approach are expected to translate into lower prices for end-users. In addition, it could be cheaper to import different machine types or machines from countries where the legislative gap between trading countries was previously greater.

On the other hand, it became clear during interviews, that some end-users are concerned that harmonisation could lead to an increase in the costs of mobile machinery products. This was due to their experience with the pure Type Approval system used for tractors. This finding is in line with the manufacturers experience with Regulation 167/2013, which required a lot of effort and costs. For example, this regulation was said to have resulted in a price increase of 50 % for tractors in one Member State. There is also concern, due to the experiences with Regulation 167/2013, that the pure Type Approval option could result in less flexibility and diversity in the mobile machinery market. For example, it is currently standard practice in the agricultural sector to change the machines depending on the need of the user.

Regarding rental companies, the information collected suggests that they sometimes experience unnecessary costs and delays when registering machinery ownership. This process often requires proof of homologation. There are cases of rental firms not getting certifications at the right time or in the right way. For example, when the machine is CE marked or has an environmental certification there may be scepticism on the part of market surveillance authorities further down the line even if homologation for road approval has already been performed. Rental companies favour harmonisation because it could make it easier to register machines and to have a fleet with similar number plates, including the possibility to offer cross-border rentals.

2.4. Analysis and findings from the CBA of Member State authorities

In this sub-section, the preliminary findings from the CBA for EU Member State authorities are presented. DG GROW has surveyed this stakeholder group as part of the targeted consultation and received responses from 19 MS. Member State authorities in this study generally cover three types of authority: Approval authorities, Market surveillance authorities, and authorities responsible for both tasks.

The results from this analysis should be taken with some caution, due to our concerns about the quality of data. Around 60 % of respondents were not able to provide data on the potential cost effects of harmonisation or find reliable figures for baseline costs. Furthermore, nine MS did not participate in the survey and their values were imputed in the analysis.

We based the data imputation on the average costs of similar Member States. The MS were grouped together based on the complexity of the current conformity assessment procedure and the level of labour costs. MS that have low vs high labour costs[23] were grouped together and the second layer of grouping was added by taking the complexity of the domestic system[24] into account. Data availability also had a role in grouping the countries. In total, we defined three groups of MS[25] with commonalities in their national regulatory framework meaning that the costs should be comparable.

[23] Labour costs data was based on ISCO staff categories (2; 3; 4; 7; 8), retrieved from the Structure of earnings survey (Eurostat).
[24] The complexity of the current system in each of the MS were already assessed in the previous impact assessment: The Ecorys final report on EU harmonisation of requirements for the road circulation of mobile machinery: https://ec.europa.eu/growth/content/final-report-eu-harmonisation-requirements-road-circulation-mobile-machinery-0_en
[25] Group 1 includes: France, Germany, and Italy. Group 2 includes: Austria, Belgium, Denmark, Finland, Ireland, Luxembourg, Netherlands, Portugal, Romania, Spain, Sweden, and United Kingdom. Group 3 includes: Bulgaria, Cyprus, Croatia, Czech Republic, Estonia, Greece, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia, and Slovenia.

Box 3. METHODOLOGY OVERVIEW FOR THE CBA OF MEMBER STATE AUTHORITIES

To analyse the costs and benefits for Member State authorities associated with the potential harmonisation of the road safety requirements we have followed these methodological steps:

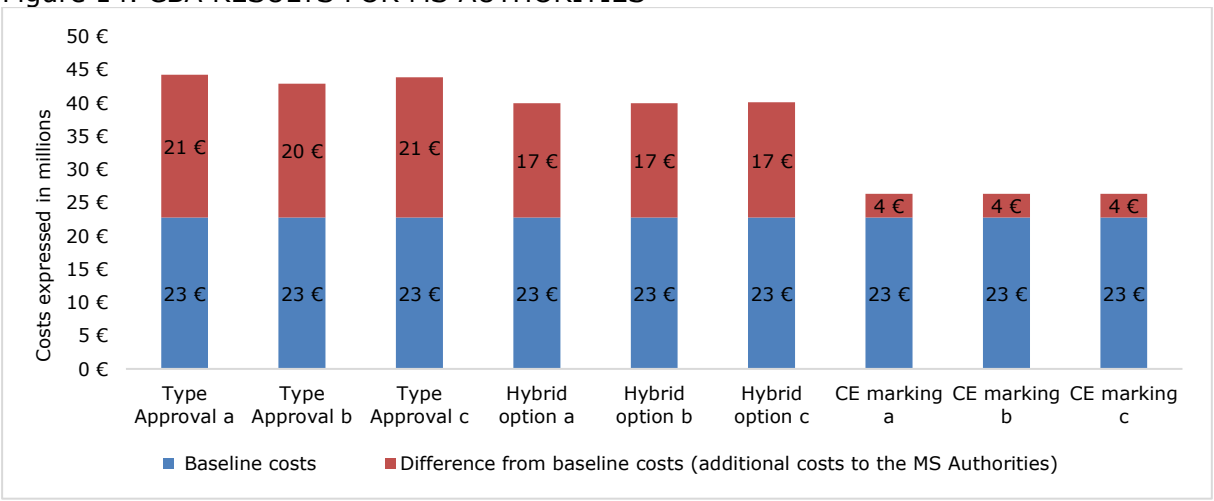
1. Data collection through surveying Approval Authorities and Market Surveillance bodies. The sample includes responses from 21 national authorities from 19 EU MS.
2. Data provided by the Approval Authorities were separated from data of Market surveillance bodies. Missing data were imputed based on responses from other similar MS.
3. Groups of similar MS were grouped based on these criteria: Low vs. High labour costs and complexity of the current road approval system.
4. The collected and imputed data were added together and the present value at a 4 % discount rate, over a ten-year appraisal period was calculated. Since we had some data for all MS, no extrapolation was needed.

2.4.1. Total costs and total cost savings of the MS authorities.

In total, all **EU Member State authorities currently spend around EUR 23 million on the enforcement of existing rules** for the requirements of the road circulation of mobile machinery (over a 10-year appraisal period). The enforcement activities usually include tasks such as granting the approval for mobile machinery, market surveillance, vehicle conformity spot checks, and the removal and storage of non-conforming vehicles.

In contrast with the other NRMM stakeholder groups, **the potential EU harmonisation would not result in cost savings for Member State authorities**. As shown in Figure 14., **every policy option will create additional costs**. Such an increase is mostly driven by the adaptation costs (one-off and recurring). However, the magnitude of such costs varies with the proposed policy options.

Figure 14. CBA RESULTS FOR MS AUTHORITIES



Source: PPMI analysis.

Figure 14. above indicates, **the most expensive policy option that could be adopted is the EU Type Approval option, while the least expensive is the CE marking option.** As shown in the previous sections of this report, the 'traditional' Type Approval system is the most complex and indeed the most expensive system for all stakeholder groups. This is also true for Member State authorities. It could be especially costly to those MS whose current conformity assessment procedures are not very demanding or who have no system in place. However, balanced against this there could arguably be benefits in such countries from a product safety perspective.

The analysis also shows that there are no major cost differences between the policy sub-options. Such findings are mostly driven by the survey questionnaire design – only questions on adaptation costs required the provision of answers for each policy sub-option, while harmonisation effects on direct enforcement costs were only gathered for aggregated policy options. However, many respondents (mostly from MS with little demanding

conformity assessment procedures) could not differentiate between the policy sub-options anyway, as they were unfamiliar with existing national regulatory approaches and conformity assessment procedures and systems and the nuances in terms of differences between these.

2.4.2. Costs and cost savings by Member States

The costs of harmonisation strongly depend on the current domestic conformity assessment system. The results of a targeted consultation suggest that some of the Member States (e.g. Denmark and Bulgaria) do not yet have an established system either for Approval or Market Surveillance for the road circulation of NRMM. This leads to two conclusions. Firstly, any harmonisation attempt would increase costs to such authorities, because they will have to establish the system. Secondly, such authorities are unable to speculate on the expected costs, because they have no system to compare the policy options (and sub-options) with. For example, the Bulgarian representative could only provide us with the insight that any of the proposed policy options would cost them a lot but was not able to speculate about the potential cost effects of the different policy options.

On the other hand, there are Member States that have well-established systems for road circulation of NRMM and can provide reasonable input to the assessment of the potential costs of different policy options and sub-options (e.g. Germany). Their data also show that even if such MS have a system already, on average they still do not expect any cost savings from the potential harmonisation of NRMM legislation at EU level. Data show that switching from an old system to a new one and complying with a harmonised EU Regulation carries some cost implications.

Member States that have a rigid system in place do not expect substantial one-off adaptation costs (e.g. Germany, France), while those that have not very demanding systems do. In addition, the authorities do not expect substantial costs for maintaining and developing national rules. Hence, harmonisation costs are mostly driven by enforcement costs[26].

The variation of the potential impacts of harmonisation on the cost effects[27] is illustrated by Figure 15. For example, MS authorities in Spain would spend EUR 342 000 more under the TA sub-option 'a' (compared against the baseline) over a ten-year appraisal period. While, under the CE marking sub-option 'a' Spanish Authorities would potentially save around EUR 1.8 million over a ten-year appraisal period.

The MS, mentioned in the figure below, have contrasting regulatory approaches, as well as different levels of complexity in their existing national procedures: Denmark currently has no system[28]; Germany has a well-established and highly demanding system; while Spanish conformity assessment procedures were assessed as placing a medium level of burden on manufacturers[29]. One would expect different harmonisation cost effects for these MS because the total costs are driven by recurring costs while the market sizes differ substantially. The survey results confirm this expectation – the potential costs of harmonisation differ significantly between the three countries, with the highest costs experienced by Germany. This can be explained by taking the market size into account. For example, Germany produces more NRMM vehicles than any other EU country, therefore, the German authority might expect a substantial increase in its workload, and therefore in costs. German-manufactured vehicles sold in other EU countries will most likely be approved by the German authorities rather than by the authorities of the importing countries.

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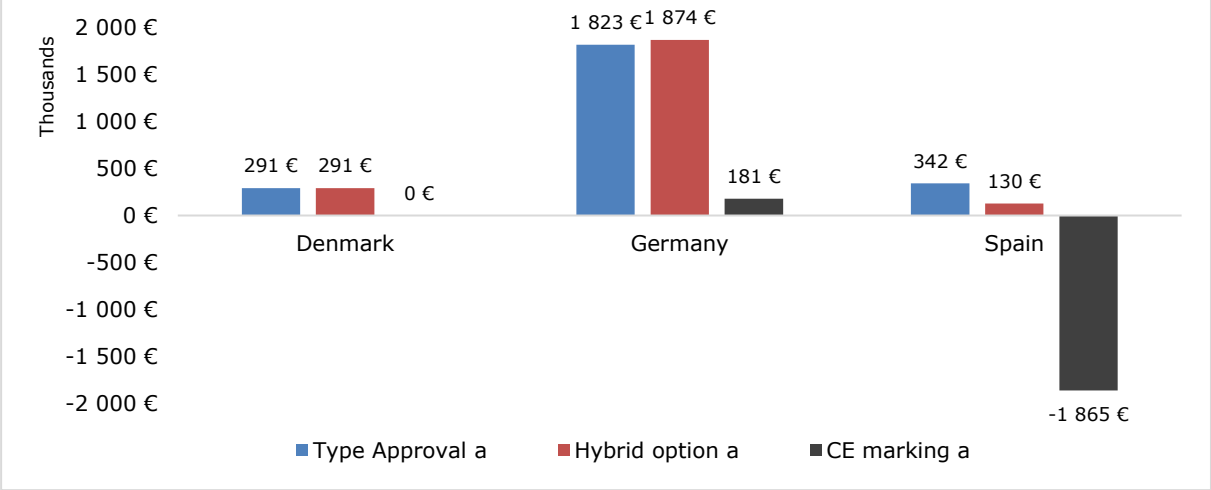
[26] Enforcement costs are defined as enforcement of the existing rules for the requirements for the road circulation of mobile machinery. For example, such costs can include the following tasks: granting the approval of the machinery; customs/market surveillance; vehicle conformity spot checks; removal and storage of non-conforming vehicles.
[27] Costs under harmonised system minus costs under the current system
[28] Denmark's potential costs were imputed based on the average costs of a group of similar Member States.
[29] ECORYS. 2016. "Study on the EU harmonisation of the requirements for the road circulation of mobile machinery". EASME: Brussels. Accessible from: https://ec.europa.eu/growth/content/final-report-eu-harmonisation-requirements-road-circulation-mobile-machinery-0_en

Figure 15. HARMONISATION COST EFFECT FOR SELECTED MS AUTHORITIES



Source: PPMI analysis.

Table 4 shows the percentage of the costs that MS authorities currently incur and would incur under the harmonised system in relation to the overall NRMM market size. The figures indicate that Spanish authorities' costs correspond to 0.14 % of the total value of Spanish NRMM production. Under the 'Type Approval' and 'Hybrid options' this share is expected to increase. On the other hand, costs incurred by the authorities in Germany are negligible (less than 0.01 %) compared to the overall market size.

Table 4**.** THE COSTS INCURRED BY THE MS AUTHORITIES UNDER THE PROPOSED POLICY OPTIONS IN RELATION TO THE RESPECTIVE MARKET SIZE

Policy sub-option	Denmark[30]	Germany	Spain	EU (aggregated values)
Baseline	-	Negligible	0.14 %	0.02 %
Type Approval a	0.02 %	Negligible	0.16 %	0.04 %
Hybrid Option a	0.02 %	Negligible	0.15 %	0.03 %
CE Marking a	-	Negligible	0.03 %	0.02 %

Source: PPMI analysis.

On the other hand, countries that have low levels of production and less established systems for road approval, have no clear basis for comparison and cannot provide reliable estimates. It is reasonable to believe, however, that their compliance costs might fall within the interval of costs expected by such MS authorities, which according to our survey vary from EUR 20 000 to EUR 2 million over the ten-year appraisal period. In some cases (e.g. for countries with no or very little production, such as: Cyprus, Malta, or Luxembourg) costs might be close to zero.

Overall, despite the variations between the MS, EU regulatory harmonisation is expected to increase the enforcement costs for Member State authorities compared to the current system. However, most of the MS viewed harmonisation as a positive change that would most likely bring some wider economic benefits to their domestic markets.

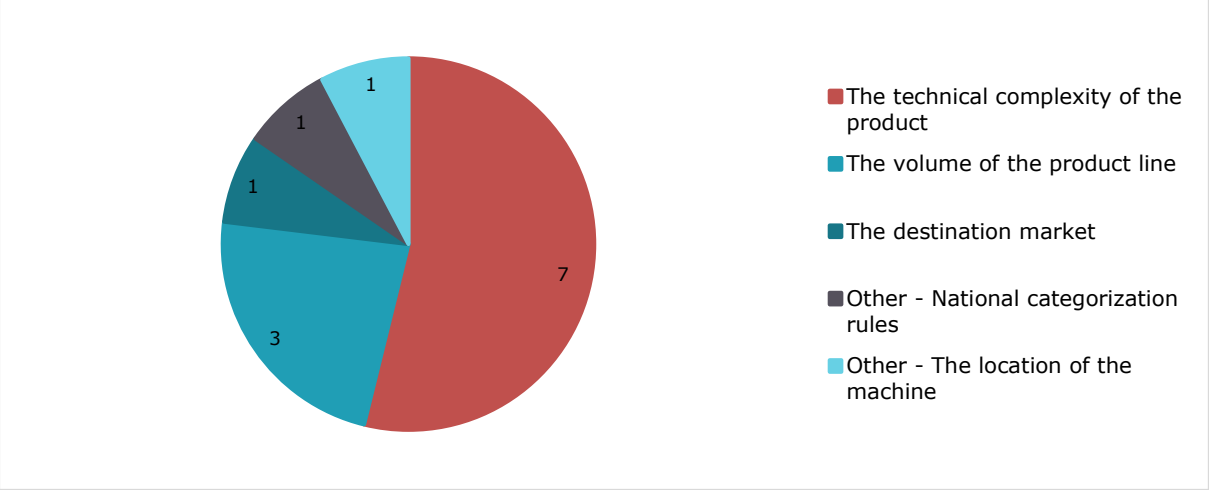
2.5. Third party data analysis

In this section, we present the findings for the third party stakeholder group. The basis for the analysis was the survey of third parties, supported by interviews. The survey covered six EU Member States that added additional insights[31]. This stakeholder group was not included in the CBA calculations because a benefit to a third party is a cost to other

[30] Currently Denmark has no costs related to the road approval of NRMM and does not expect to have any under CE marking policy option.
[31] We have interviewed two notified bodies, seven technical services, and one inspection service.

stakeholder groups such as manufacturers or distributors, which were already included in the CBA. In addition, it is important to note that the inspection service and notified bodies receive funding from the Member States and therefore are less dependent on market fluctuations.

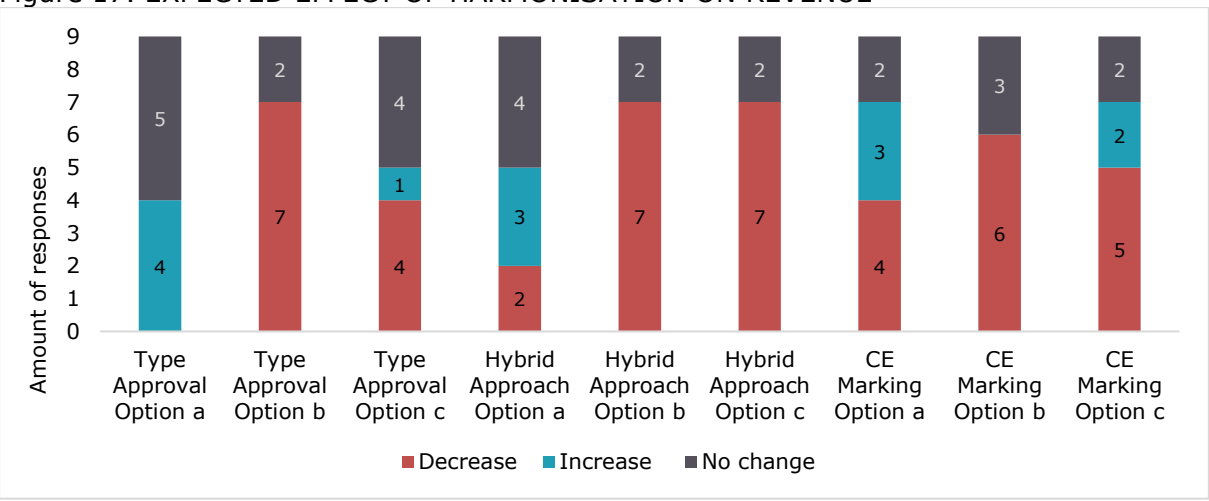
Figure 16. CRITERIA FOR DETERMINING TECHNICAL SERVICE FEES



Source: PPMI analysis.

Seven out of eight third parties claim that the fee is determined based on the complexity of the product. It is common practice that technical services also spend time and money to drive to the manufacturers' plants where they carry out the testing and/or inspection. According to the manufacturers' data, the average annual fee paid for third party testing and certification purposes by a manufacturer is approximately EUR 82 000. Large manufacturers pay around EUR 104 000 annually on average and SMEs pay approximately a third of what large manufacturers pay. Considering that SMEs sell on average 238 machines per year, which is only one-tenth the number of machines sold by manufacturers, SMEs pay a higher fee per machine than manufacturers and therefore experience higher cost burden compared to large firms.

Figure 17. EXPECTED EFFECT OF HARMONISATION ON REVENUE



Source: PPMI analysis[32].

From a cost-benefit perspective, the survey and interviews with the third party stakeholders revealed that their views on the impact of possible future harmonisation depended on the sub-option chosen. As shown in the figure above, the 'traditional' Type Approval option, sub-option 'a', where third party testing and involvement is required for the whole machine, is expected to increase the revenue for almost half of the sample. This

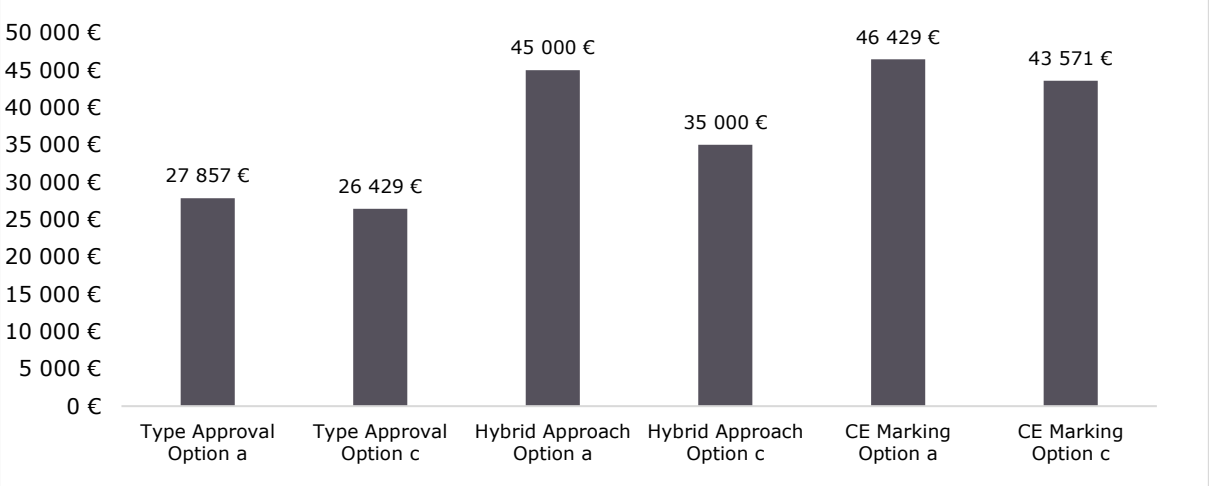
[32] Question: What is the estimated change that the potential new … policy option might have on the direct costs? (9 responses)

is likely to be an overestimate, as some participants did not consider the effect of harmonisation itself, which will likely lead to less testing overall. Nevertheless, in some countries, e.g. Slovakia and Croatia, mobile machinery is often not tested at all. Here, even the introduction of the testing required for only safety critical components (as required by sub-options 'c') could increase the revenue according to the study participants. Although policy sub-options 'a' are expected to boost revenue because of the requirement for full third party involvement, the final effect will be smaller if the machines are only homologated once.

For sub-option 'b' under each policy option, on the other hand, the opposite would be expected to happen, according to the feedback received from most market participants. As elaborated upon during interviews, concerns were expressed that the options that would allow for self-assessment and self-testing of the whole machinery would clearly reduce the revenue of technical service agencies. It was highlighted that the loss would be greater for smaller technical services and those that deal more or solely with NRMM. However, it is very rare that a technical service only tests mobile machinery. The most expensive policy options for the third party in terms of lost income are expected to be the sub-options under 'b'. Several interviewees stated they were more concerned about sub-option 'b' from a safety perspective than an economic perspective.

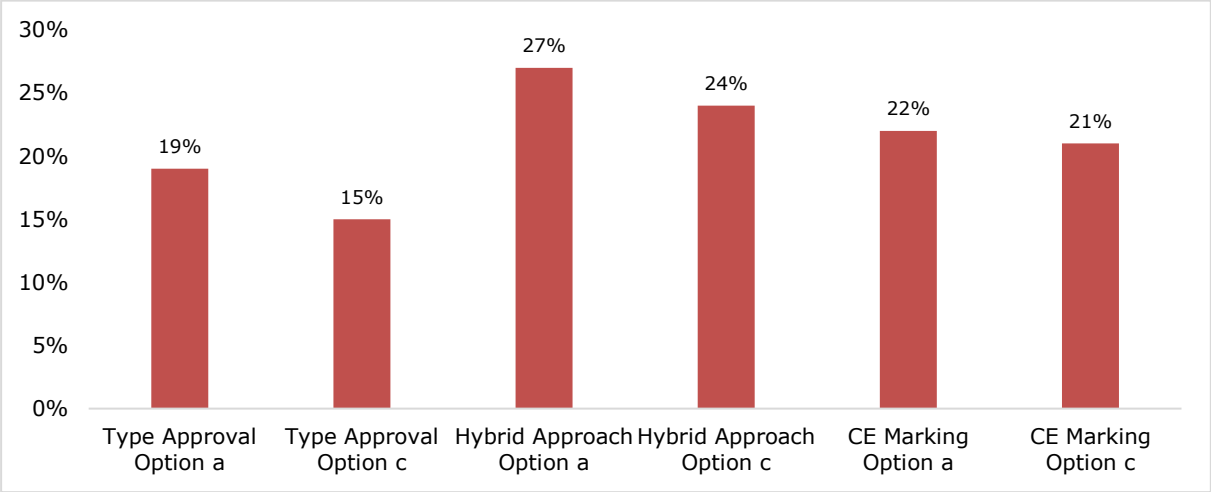
The overall trend is that, third party stakeholders would prefer policy sub-options that foresee the certification of each system component and technical unit over those policy sub-options that allow self-testing. Despite this, it was recognised that it would be expensive and complicated to test the whole machine. This is because there are many different types of machines requiring different methods of testing compared with what is currently being conducted. Several of the participants stated that they performed tests on mobile machinery very rarely. They argued that their scope of testing is not large enough to perform approval of the whole vehicle. For example, one interviewee stated that the Type Approval option is the 'hardest' option and 'impossible' to implement because of the costs associated with investing in the testing of the entire machine. This explains the graph on the one-off adaptation costs below. One-off adaptation costs are higher for all sub-options 'a' than sub-options 'c'.

Figure 18. AVERAGE ONE-OFF ADAPTATION COSTS IN ABSOLUTE NUMBERS



Source: PPMI analysis.
Question: How much would it cost to switch from the current system to the new one under the following options…? (7 responses). Sub-options 'b' were not asked about because it would likely involve a system with no third party involvement.

Figure 19. AVERAGE ONE-OFF ADAPTATION COSTS AS PERCENTAGE OF REVENUE



Source: PPMI analysis.
Question: How much would it cost to switch from the current system to the new one under the following options…? (7 responses). Sub-options 'b' were not asked about because it would likely involve a system with no third party involvement.

The distinction between SMEs and large enterprises does not make a significant or meaningful difference to the analysis of the findings on the estimated adaptation costs for the third party group. The primary reason for this is the limited availability of our sample data. There is also greater variation in the sample between the different Member States than between sizes of companies.

Regarding Type Approval, there was some concern about the effect of this policy option on the flexibility of the mobile machinery market in some Member States. For example, the Swedish market has a high level of customisation of NRMM to meet specific customer needs and one interviewee worried that the Type Approval of the whole vehicle could reduce flexibility for the consumer to shape the design of the final machine. Several argued that the most important factor in determining the best policy option is to check how far the options concerned allow for sufficient flexibility for users of mobile machinery.

The notified bodies differ from the technical services in that their revenue is not dependent on fees from technical testing. For this group, harmonisation could facilitate clearer and easier data collection of test results and thereby reduce administrative costs. There may be some adaptation costs in digitalising such a system, but the interviewees did not believe that the chosen policy option would matter in this regard. Staff would not need to be reduced since NRMM represents only a small share of the overall work. The notified bodies did not have strong opinions about the different policy options, but this finding was based on a small sample.

Despite the overall negative attitude towards sub-options that exclude third party involvement, the third parties generally agreed that harmonisation would not reduce their revenue or increase their business costs drastically. The analysis finds that third party groups in different Member States expect differentiated impacts of harmonisation in terms of the effects on costs depending on the prevailing regulatory system in place in their country. However, study participants agreed that safety is an even more important factor than costs for mobile machinery. For this reason, all participants were positive regarding the potential impact of harmonisation, believing it would increase safety procedures and quality standards across Europe. In order to do this, they nevertheless believed it would be crucial that they are involved in the homologation process. The interviewees tend to prefer the Type Approval option a[33], and reject the sub-option 'b', foreseeing some negative effects on their business and road safety otherwise.

[33] EU approval of the entire mobile machine granted by Member State authorities, certification by an authorised third party ("notified body") of safety critical systems and self-testing ("self-assessment") of non-critical systems.

2.6. Road safety and accidents

One of the topics addressed through the interviews, regards the degree of safety of mobile machinery and the incidence of accidents, depending on the regulatory approach. **No respondents reported that accidents or faults had occurred related to the quality of the machines or the different conformity assessment procedures.** This finding applied for all the groups we interviewed.

There is a lack of good data on the number of road accidents involving mobile machinery. However, it is our overall understanding from interviews across the Member States and sectors that this is due to their infrequency. Furthermore, mobile machinery is not meant to go on the road and in several countries, for example, Bulgaria and the UK, it is completely forbidden to drive some types of mobile machinery on public roads.

In the few cases where there are recorded accidents, these appeared to have occurred due to a lack of machine maintenance and the recklessness of users in driving the machinery. Manufacturers believed that their machinery was safe and as such, the harmonisation of the requirements for road circulation, regardless of the policy option, should not have a substantial influence. Several manufacturers stressed that no matter the market, their products are manufactured using the same production process, and go through the same internal processes to ensure their safety. The impression from interviews is that the machines are safe since they follow the regulatory requirements set out in Machinery Directive 2006/42/EC and are already being CE marked. For example, if NRMM comes from Germany, additional third party testing may be undertaken in other export markets on top of testing to meet national German regulatory requirements that manufacturers have already undertaken themselves.

2.6.1. Number of road accidents with mobile machinery

Throughout the study, very few interviewees could contribute any statistics on road accidents involving non-road mobile machinery. According to data collected from targeted consultation by DG GROW, 17 out of 22 MS authorities reported a lack of available statistics. The study's interviewees confirmed that there is a lack of statistics available. However, some statistics from Denmark, Malta, Ireland, Slovakia, and Finland are presented below. The data confirm that there are very few accidents on the road involving mobile machinery.

We checked several databases, but the data were not disaggregated for NRMM explicitly. Regarding statistics, it is an issue that traffic accidents are usually counted for vehicles and tractors, while mobile machinery does not fall within either category. Mobile machinery is often grouped with other machines. DG MOVE and the EU injury database administered by DG SANTE did not provide a breakdown by vehicle type and the official German and Swedish databases included mobile machinery in an opaque "other" category.

National statistics were recorded for traffic accidents in Denmark, where there have been between 12 and 18 accidents involving mobile machinery every year, thus 0.0066 % of total road accidents annually[34]. In Malta, the office for national statistics deems mobile machinery as "special purpose vehicles"[35]. During 2018 four people were slightly injured, two users and two others in the vicinity of the machine on the road[36]. One person was slightly during the first quarter of 2019. According to a respondent from Lithuania, there are generally around 1-2 road accidents involving mobile machinery used in the agricultural

[34] The report states that mobile machinery account for one third of accidents when the statistics for tractors and mobile machinery are combined. Havarikommisjonen for vejtrafikulykker, (2017), Temarapport nr. 14, Traktorulykker.
[35] It has other purposes than carriage of passengers or goods and examples include self-propelled rollers and mobile cranes.
[36] National Statistics Office for Malta, (2019). Road traffic accidents. Accessed 12.07.2019. https://nso.gov.mt/en/News_Releases/View_by_Unit/Unit_B3/Environment_Energy_Transport_and_Agriculture_Statistics/Pages/Road-Traffic-Accidents.aspx

sector annually. In the UK, 25 road accidents occurred with harvesters, sprayers, agricultural machines and mowers in 2017, of which 8 were severe[37].

Tables 5 and 6 display the annual number of road traffic collisions in Ireland and Slovakia. They confirm that accidents with mobile machinery, as a share of the total number of traffic accidents, are rare. The recent decrease in the number of accidents is a result of the strong efforts made by key stakeholders, e.g. the National Labour Inspectorate in Slovakia, to reduce accidents at work by increasing awareness among workers and employers and improving overall safety strategies[3839]. Although we are strictly looking at road accidents here, the positive effect the Machinery Directive had on the number of machinery-related accidents and injuries[40] is also likely to have had a positive spill-over effect on road accidents.

Table 5. NUMBER OF TRAFFIC ACCIDENTS INVOLVING MOBILE MACHINERY IN IRELAND[41]

Year	Total number of traffic accidents in Ireland			Number of traffic accidents involving mobile machinery			Percentage of traffic accidents involving mobile machinery		
	Fatal	Serious	Minor	Fatal	Serious	Minor	Fatal	Serious	Minor
2016	172	830	4876	2	2	17	1.2 %	0.2 %	0.3 %
2015	155	727	4949	5	3	19	3.2 %	0.4 %	0.4 %
2014	179	646	4972	3	6	17	1.7 %	0.9 %	0.3 %

Source: Road Safety Authority of Ireland.

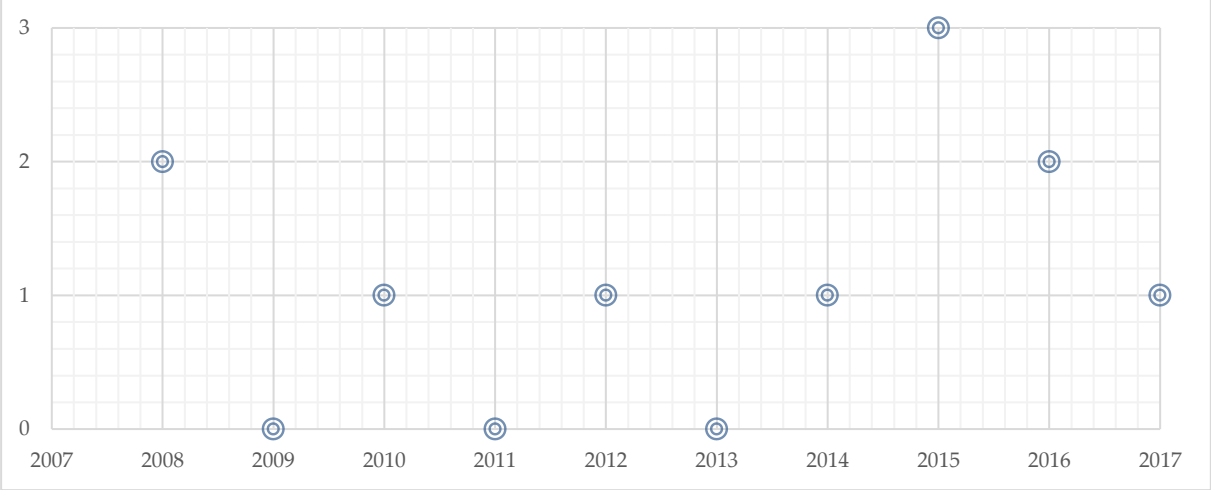
Table 6. NUMBER OF TRAFFIC ACCIDENTS CAUSED BY MOBILE MACHINERY IN SLOVAK REPUBLIC[42]

Year	Total number of traffic accidents in Slovak republic	Number of traffic accidents caused by mobile machinery	Percentage of traffic accidents caused by mobile machinery
2018	13902	8	0,0575 %
2017	14013	10	0,0713 %
2016	13511	9	0,0666 %
2015	13535	8	0,0591 %
2014	13307	-	-
2013	13586	14	0,1030 %
2012	13945	15	0,1075 %

Source: Slovak Police

[37] The latest available data. Source: Stats19, "Number of reported road accidents involving an agricultural vehicle, by severity and body type, Great Britain: 2017".
[38] Eurofound. 2017. "Slovakia: Positive trend in number of occupational accidents". Accessed 18.09.2019 from https://www.eurofound.europa.eu/publications/article/2017/slovakia-positive-trend-in-number-of-occupational-accidents
[39] HSA. 2019. "Figures issues by the Health and Safety Authority show a 23 % decline in work related fatalities in 2018". Accessed 18.09.2019 from : https://www.hsa.ie/eng/news_events_media/news/press_releases_2019/figures_issued_show_a_23_decline_in_work_related_fatalities_in_2018.html
[40] Technopolis group. 2017. "Evaluation Study of Directive 2006/42/EC on Machinery". Luxemburg: Publications Office of the European Union: 2018.
[41] Fatal: Where at least one person is killed as a result of the collision and death occurs within 30 days. The definition of "serious injury" is an injury for which the person is detained in hospital as an 'in-patient', or any of the following injuries whether or not detained in hospital: fractures, concussion, internal injuries, crushing, severe cuts and lacerations, severe general shock requiring medical treatment. Minor: Where there are no deaths or serious injuries. The definition of a "minor injury" is an injury of a minor character such as a sprain or bruise.
[42] This was gathered by a participant in Slovakia who received the numbers from national police records.

Figure 20. NUMBER OF TRAFFIC ACCIDENTS CAUSED BY MOBILE MACHINERY IN FINLAND

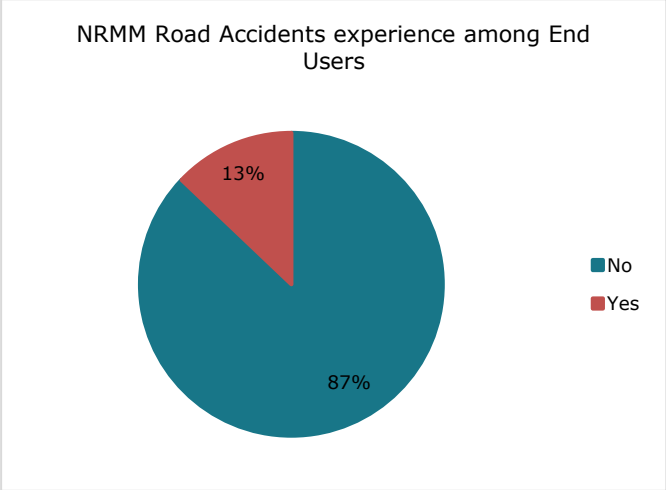


Source: Compiled by PPMI, data provided by the Finnish data crash institute OTI.

Regarding Finland, the fatal accidents above involved 21 people of whom 11 died. Half of the accidents happened during the summer months and regular working hours and in most cases the weather was good with clear skies. In 9 out of 11 cases the driver of the machine was at work at the time of the accident and in two cases travelling to a work location. According to the accident investigation teams, the driver was at fault in 6 of the accidents.

The available statistics of road accidents involving mobile machinery presented so far suggested different causes for the accidents, but this study concerns itself with accidents that happen due to **malfunctioning of the mobile machinery that could have been avoided by a more rigorous conformity assessment system**. There are no statistics on such specific accidents and none of the manufacturers or distributors interviewed for this study could tell of such accidents. Figure 21 below shows that only four end-users in our sample had experienced NRMM road accidents.

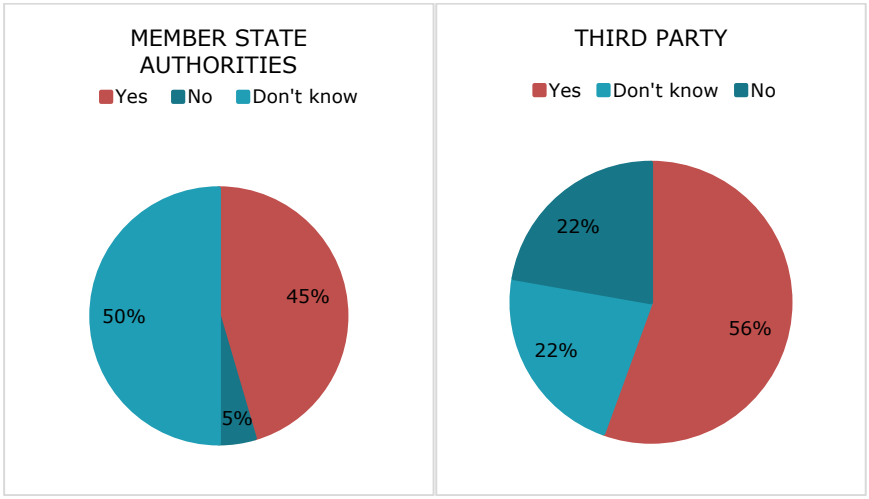
Figure 21. NRMM ROAD ACCIDENTS EXPERIENCE IN SAMPLE



Question: "Has your company ever experienced a mobile machinery road accident?" (31 respondents).

The lack of available data mattered for the study participants' opinion on whether harmonisation would decrease the incidence of accidents. Because of the lack of available data and personal experiences with accidents, none of the manufacturers and distributors interviewed were certain about the positive impact of harmonisation on road accidents. Despite this, from a normative point of view, a majority of the third party participants and almost half of the Member State authorities believed that having a harmonised system could raise standards and decrease NRMM road accidents in Europe.

Figure 22. HARMONISATION IMPACT ON THE NUMBER OF ACCIDENTS



Question: "Will harmonisation at EU level (compared with the current situation of national-specific requirements in each Member State) reduce the incidence of road accidents due to malfunctioning mobile machinery?" (22 and 9 respondents respectively).

2.6.2. Safety concerns

During the study, safety concerns were raised mostly by the third party stakeholder group. Giving the manufacturer more responsibility, even for non-safety critical components, was both a risk and a violation of long-held procedures. Most third party interviewees were concerned about leaving manufacturers with sole responsibility for testing due to a lack of confidence in their ability to carry out rigorous testing. In general, third party testing increases accountability because the tester is an independent party not tied to the manufacturer.

Despite this concern, the majority of third party participants believed harmonisation could reduce the number of road accidents with mobile machinery and increase European safety standards. In several countries, there are no requirements for third party testing at all. In Sweden, for example, there is no requirement for registration or road certification below the 30 km per hour speed limit. Several interviewees stated that mobile machinery is not inspected and as a result there may be unsafe machines on the road in Scandinavia.

2.6.3. Cause of accidents

Another finding from the study is that mobile machinery may never reach the safety standards that apply to other vehicles because mobile machinery is not meant for road usage. Whereas the incidents recorded in Malta were only of a non-serious nature recent Danish and Dutch case studies found that accidents caused by tractors and mobile machinery can cause more serious harm than regular car accidents because of the lack of built-in technology that safeguards against collision impact[43]. Despite this, no serious road accident incidents were recorded or mentioned in the study. Interviewees agreed that mobile machinery may never reach the safety standards that apply to other vehicles (e.g. automobiles or tractors) due to the core purpose of the machines. They have various tools attached to them, which are essential for performing certain tasks, but might negatively affect the safety of the vehicle, e.g. if there is a collision with another vehicle.

In addition, we found that accidents with mobile machinery are usually caused by human error. Out of the 7 accidents involving mobile machinery analysed in the Danish case study 5 machines were investigated for technical faults etc. Faults related to lighting

[43] Havarikommisjonen for vejtrafikulykker, (2017), Temarapport nr. 14, Traktorulykker.

were found on some[44] of the machines and none of the mobile machinery were registered, but this is common practice with mobile machinery in Denmark. However, the faults on the machines were not the cause of the accidents in most of the cases. In one example, the owner had not locked the brakes on the machine while transporting it behind a tractor. The Dutch study found that some drivers of agricultural or construction vehicles failed to remove or protect the equipment before going on road, which exacerbated the accident outcome and restricted the driver's view[45]. This confirms the finding from interviews, unanimously agreed to, that road accidents involving mobile machinery are mainly caused by human error, and not by poor national standards or unsafe machinery. For example, an interviewee from the UK reported that there are a few road accidents involving combined harvesters and mowers annually, but all of them occur because of human error or other traffic participants hitting the machine when the construction sites are too close to the road or are not well enough lit.

National legislation was discussed as a possible cause during the interview but was dismissed as a cause of accidents as a result of the discussions. For example, a French respondent commented on the strict rules for road circulation that currently apply in France. Mobile machinery is not allowed to be taken onto highways, but the other roads may be too narrow for the machines. In these instances, the impact caused damage to the machine only. Generally, however, the safety of road machinery in France is quite high and has been improved over the years. The main reason for this was stated as being that regulations and safety requirements were already introduced some years ago to ensure the road safety of machinery. The same positive trend could be seen in the Slovakian statistics above.

Overall, few road accidents with mobile machinery are recorded in Europe. A closer look at the incidents shows that accidents are generally not caused by faults with the products or issues with technical requirements and certification.

[44] It was not clear in the study how many.
[45] The Dutch Safety Board, (2010), Road traffic accidents with agricultural and construction vehicles, thematic study. The Hague: The Dutch Safety Board

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