Development of an EU framework to assess the overall impacts of occupational health and safety (OSH) prevention on the performance of construction enterprises

Final report

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Client: EASME

Rotterdam, 28.05.2020

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Executive summary

Context of the study and research questions

The construction sector is the biggest industrial employer in Europe. It represents 9% of the European Union's GDP and employs over 16 million Europeans. Even though the sector is home to several major multinational companies, it is mainly characterised by a supply chain of small and medium sized enterprises (SMEs) as well as micro and small enterprises (MSEs). The sector faces a number of challenges, which are especially affecting SMEs. One specific challenge is the lack of skilled workers in the sector.

The risky working environments as well as an ageing workforce lead to the question on how the construction sector can improve its attractiveness to potential employees as well as to avoid early retirements. **Offering improved working conditions through investing in OSH** may be an important step in the right direction. There are various physical (and psychological) hazards in the construction industry (e.g., vibration, noise, working at height, handling of heavy loads, exposure to chemicals and airborne substances). Consequently, numerous interventions are necessary to mitigate risks to safety and health. Several policy programmes and activities are in place to address these issues by improving the level of health and safety at work. However, even though these actions contribute to improved health and safety at work (across sectors), the efforts mostly regard legislative compliance.

The European OSH Strategic Framework indicates that MSEs and SMEs have particular difficulties in complying with OSH legislation. There is some evidence that costs deter implementation of safer working methods in small companies. Therefore, emphasising profitability and productivity gains and providing **a business case for investing into OSH measures** could incentivise companies to improve OSH prevention. Consequently, research into the development of an EU framework to assess the impacts of OSH prevention on the performance of construction enterprises could improve OSH in construction. It could be an important step in awareness-raising of the advantages to OSH prevention. In fact, **prevention should increasingly be viewed as an enabler of performance**.

Study approach and activities conducted

This study developed an EU framework to assess the impacts of OSH prevention on the performance of construction enterprises. The focus in this assessment was on micro-economic benefits of OSH implementation, not societal or sectoral benefits. For this purpose, a taxonomy of costs and benefits of OSH prevention was created based on desk research. In addition, the study team conducted a mapping of national and sectoral initiatives related to OSH prevention in construction and their costs and benefits profiles. Finally, a financial framework was developed to allow companies to assess their benefits of investing into OSH. The framework was validated in case studies with construction companies as well as in consultation with stakeholders.

Main findings of the study

A Taxonomy of costs and benefits of OSH prevention

Direct benefits of OSH measures stem from the reduction in work place accidents. The amount of workplace accidents in construction companies is expected to be reduced after implementation of OSH measures. In monetary terms, reduced costs can be subdivided into two areas: reduced insured costs and reduced non-insured costs. The reduced insured costs correspond to the lower or non-increasing costs of the insurance premiums due to a reduced number of accidents. Non-insured costs cover the costs not typically covered by insurance, such as identifying replacement employees, fines, contractual penalties for late work delivery, and more.

The indirect benefits are not necessarily part of the objectives of the OSH measures but rather they can be characterised as positive side effects that emerge. Thus, through the reduction in accidents, wider firm-level benefits may emerge such as:

- enhanced productivity;
- improved mental health;
- better quality of service;
- and reputational benefits with clients and other stakeholders.

While national or sectoral programs may financially contribute to OSH investments, overall there are still investment costs associated with OSH. The **direct costs** are those that relate to the costs of implementing an OSH measure. This includes items such as the investment of staff time in managing the OSH measure and the cost of training materials or new equipment. The **indirect costs** are unintended side effects. These can be considered as 'opportunity costs' meaning that the time and resources spent could have been dedicated towards other revenue generating activities, such as working on construction projects or new business leads.

Mapping of national and sectoral initiatives on OSH prevention in construction

A total of 107 initiatives were identified and data were collected on the types of costs and benefits associated with these initiatives. About half of the schemes identified were **generic approaches to tackle OSH risks**. These include short training courses, certification schemes and communications campaigns. Their aim is usually to bring about safety and health improvements across the sector. The other half **tackled specific OSH risks and hazardous activities**. They include schemes to promote the use of lifting equipment, education campaigns about forklift safety and safer roadside working during highway maintenance. For this type of scheme, the indicators of success are much clearer and, potentially, easier to measure.

Overall, the following categories of initiatives were identified:

- Training and guidance materials;
- Online tools/technologies/hardware/apps;
- Certificates/accreditation;
- Knowledge sharing, e.g. to establish standards/approaches;
- Bespoke guidance/consultancy;
- Insurance incentive;
- Improved commissioning practices;
- Enforcement Initiative;
- And campaigns with multiple outputs.

The analysis of these initiatives identified the benefits and costs associated with each scheme as well as the particular challenges they aim to address. These challenges include physical, mechanical, electrical, thermal, chemical, and psychological risks as well as the changing nature of construction sites, the skills shortages in the labour market and the use of migrant workers, and finally the need to provide services through subcontractors. These challenges can be categorised into different stages of the construction process and between different types of functions across a firm. Namely, **inappropriate construction planning, inappropriate construction site conditions and operation, and inappropriate worker behaviours**.

In order to address these challenges, OSH initiatives often aim to transfer information to companies and/or encourage the companies themselves to independently invest time in OSH familiarisation and implementation activities. Another common goal is also to introduce a "safety culture" in companies so that the advice provided is adopted effectively. In fact, the ratio of benefits to costs is likely to be higher in companies that have well-established safety cultures. Therefore, **there is a clear business case to nudge construction firms towards further investment in OSH activities**.

A framework to assess the profitability of risk prevention measures

The financial framework takes **a unique company perspective and provides construction enterprises with a tool to calculate costs and benefits of investments in OSH**. The tool uses EU statistics on accidents and costs of OSH measures. In addition, it uses more granular statistics from a limited number of countries, and inputs from 20 case studies across the EU. It allows managers to compare costs and benefits of investments in OSH per worker, and optionally at the company level.

At a basic level, the tool requires only inputs from the user on company characteristics and optional choices such as insurance coverage and penalties for late deliveries. Already these limited inputs provide the user with the **accident rate before OSH investments and after OSH investments**, as well as the **costs and benefits of OSH investments and their difference**. In addition, the output shows costs per type of cost, aggregated over all measures as well as benefits per type of benefit (for example avoidance of sick pay, costs on the day of the accident). Advanced user input makes the tool more flexible but also heavier to use. Input that a more experienced user might want to view and/or change includes:

- Investments already done;
- Investment in safety equipment;
- Indirect benefits;
- Financial requirements.

Benefits that are included in the framework include direct benefits such as reduced sick leave and medical costs (adjusted depending on insurance coverage), less hours of work interruption due to accidents, fewer accident investigations (including assessing damages and making repairs), reduced worker replacement costs, fewer administrative fines and legal proceedings, and finally less project delay costs. **Costs** included are purchase of material and services, annual maintenance and writing off costs, hours of initial preparation by management, annual hours for monitoring, annual hours for training, and on-site OSH management by OSH officers.

The framework can be consulted here (currently only in English):
https://ec.europa.eu/growth/sectors/construction/health-safety_en

Findings from the case studies and stakeholder consultations

In total, 20 case studies were conducted with construction companies across 15 Member States. These include companies of all sizes with over half of them being SMEs. In addition, the case studies covered different subsectors such as the construction of buildings, civil engineering and other construction activities (e.g. demolition and electrical engineering), since these generally face different health and safety risks. The information collected is by far not representative with such a small sample. However, it allowed the study team to test input data for the financial framework as well as gain practical insights into the challenges faced by companies on the ground as well as the solutions in form of OSH initiatives implemented by companies.

The findings from the case studies show that **companies' main motives to invest into OSH** are the safety of workers, legal compliance, the company's reputation, and the quality of work. However, companies mention a great variety of reasons to invest into OSH with many of them indicating that it is difficult to limit oneself to only a few motives. In turn, **risks faced by companies** generally vary as these companies work in different fields of construction. However, the ones mentioned most were falling from heights, collisions with heavy machinery, slipping and tripping, overall negligence, musculoskeletal disorders, cuts from tools, and electrocution. In order to address these risks, **companies state their needs** to be an increased awareness among workers about OSH, improved cooperation and communication on construction sites, and the establishment of an overall safety culture in the company.

In terms of **benefits of OSH**, companies agree that avoidance of accident costs by decreasing minor and major accidents is the main benefit. In addition, companies are aware of benefits such as improved efficiency and productivity, a reduction in absenteeism, having more projects and reduced idle time between projects, and a reduction in hiring costs and staff turnover.

Generally there seems to be awareness among construction companies not only regarding the costs associated with accidents, but also the indirect benefits of investing in OSH. However, not all companies are fully aware of all costs and benefits. Therefore, in order to raise awareness and provide information to companies, a practical **handbook on investing in OSH and its benefits for construction enterprises** was created.

The handbook is accessible via this link (currently only in English):
https://ec.europa.eu/growth/sectors/construction/health-safety_en

In addition, to the case studies, valuable input came from stakeholder consultations in form of three separate workshops. These focused on:

1. The mapping of OSH initiatives and the taxonomy of costs and benefits;
2. The financial framework and the case studies;
3. And the dissemination and validation of the results.

Next to providing inputs for the workstreams and the results presented above, one of the stakeholder consultations' main outcomes was to **highlight the difficulties in assessing the costs and benefits of OSH**. This is due to various factors, for example long-term costs such as from occupational diseases are difficult to factor in, the differences between Member States and types of companies, and the difficulty of measuring indirect benefits such as reputation. In addition, the consultations also flagged that the framework would need to be complex enough to cover all important factors while being simple enough for companies to actually use it. Finally, there will be the need to update the framework over time and possibly to enhance it further. Overall,

stakeholders agreed that OSH should become part of the larger picture of doing business and that benefits going beyond accident reduction need to be highlighted. A goal that can be supported by the handbook and financial framework.

Concluding remarks

In conclusion, this work is a first step in preparing companies to invest in OSH. Researchers, practitioners and stakeholders in OSH and construction companies are encouraged to disseminate the results, use them, and further build upon them.

Zusammenfassung

Kontext der Studie und der Forschungsfragen

Der Bausektor ist der größte industrielle Arbeitgeber in Europa. Der Sektor repräsentiert 9% des BIP der Europäischen Union aus und beschäftigt über 16 Millionen Menschen. Obwohl der Sektor mehrere große multinationale Unternehmen beinhaltet, ist er hauptsächlich durch eine Lieferkette von kleinen und mittleren Unternehmen (KMU) sowie Kleinst- und Kleinunternehmen gekennzeichnet. Der Sektor steht vor einer Reihe von Herausforderungen, von denen insbesondere KMUs betroffen sind. Eine dieser besonderen Herausforderungen ist der Fachkräftemangel in der Branche.

Das riskante Arbeitsumfeld sowie eine alternde Belegschaft führen zu der Frage, wie der Bausektor seine Attraktivität für potenzielle Arbeiter verbessern kann und eine vorzeitige Pensionierung der aktuellen Belegschaft vermeiden kann. **Das Angebot verbesserter Arbeitsbedingungen durch Investitionen in den Arbeitsschutz** kann ein wichtiger Schritt in die richtige Richtung sein. Die Bauindustrie is gekennzeichnet von vielen verschiedenen körperlichen (und psychische) Gefahrenquellen (z. B. Vibration, Lärm, Arbeiten in der Höhe, Handhabung schwerer Lasten, Exposition gegenüber Chemikalien und Substanzen in der Luft). Folglich sind zahlreiche Maßnahmen erforderlich, um die Risiken für Sicherheit und Gesundheit zu verringern. Es bestehen bereits verschiedene politische Programme, um diese Probleme durch eine Erhöhung des allgemeinen Gesundheits- und Sicherheitsniveaus am Arbeitsplatz anzugehen. Diese Maßnahmen tragen zu einer (sektorübergreifenden) Verbesserung von Gesundheit und Sicherheit am Arbeitsplatz bei, jedoch beziehen sich die Bemühungen hauptsächlich auf die Einhaltung gesetzlicher Vorschriften.

Der Europäische Strategische Rahmen für Arbeitsschutz weist darauf hin, dass KMUs besondere Schwierigkeiten haben, die Arbeitsschutzgesetze einzuhalten. Es bestehen Hinweise, dass oft Kostenfaktoren die Umsetzung sicherer Arbeitsmethoden in kleinen Unternehmen verhindern. Daher, die Betonung von Rentabilitäts- und Produktivitätsgewinnen sowie die Bereitstellung eines **Geschäftsmodells für Investitionen in Arbeitsschutzmaßnahmen** könnten weitere Anreize für Unternehmen schaffen, die Arbeitsschutzprävention zu verbessern. Folglich könnte die Entwicklung eines EU-Rahmens zur wirtschaftlichen Bewertung der Auswirkungen der Arbeitsschutzprävention auf die Leistung von Bauunternehmen den Arbeitsschutz im Baugewerbe verbessern. Dies könnte ein wichtiger Schritt in Richtung einer Bewusstseinsbildung über die wirtschaftlichen Vorteile der Arbeitsschutzprävention sein. In der Tat **sollte Prävention zunehmend als Leistungsförderer angesehen werden**.

Ansatz der Studie und durchgeführte Aktivitäten

Die hier präsentierte Studie hat einen EU-Rahmen entwickelt, um die Auswirkungen der Arbeitsschutzprävention auf die wirtschaftliche Leistung von Bauunternehmen zu bewerten. Der Schwerpunkt dieser Bewertung lag auf den mikroökonomischen Nutzen der Arbeitsschutzimplementierung und nicht auf den gesellschaftlichen oder sektorübergreifenden Nutzen. Zu diesem Zweck wurde eine Taxonomie von Kosten und Nutzen der Arbeitsschutzprävention auf Grundlage einer umfassenden Literaturrecherche erstellt. Darüber hinaus stellte das Studienteam ein Mapping von nationalen und branchenspezifischen Initiativen

zur Arbeitsschutzprävention im Baugewerbe zusammen. Dieses beinhaltete auch Informationen zu den Kosten- und Nutzenprofile der gefundenen Initiativen. Schließlich wurde ein finanzielles Rahmenwerk entwickelt, das es Unternehmen ermöglicht, ihren Nutzen von einer Investition in den Arbeitsschutz auszuwerten. Das Rahmenwerk wurde in Fallstudien mit Bauunternehmen sowie in Gesprächen mit Interessenvertretern aus dem Baugewerbe validiert.

Hauptergebnisse der Studie

Eine Taxonomie von Kosten und Nutzen der Arbeitsschutzprävention

Der **direkte Nutzen von Arbeitsschutzmaßnahmen** ergibt sich aus der Verringerung der Arbeitsunfälle. Generell wird angenommen, dass sich die Zahl der Arbeitsunfälle in Bauunternehmen nach Umsetzung von Arbeitsschutzmaßnahmen verringert. In monetärer Hinsicht lassen sich hierdurch reduzierte Kosten in zwei Bereiche unterteilen: reduzierte versicherte Kosten und reduzierte nicht versicherte Kosten. Die reduzierten Versicherungskosten entsprechen den niedrigeren oder nicht steigenden Kosten von Versicherungsprämien aufgrund einer reduzierten Anzahl von Unfällen. Nicht versicherte Kosten sind die Kosten, die normalerweise nicht durch Versicherungen abgedeckt sind, z. B. die Identifizierung von Ersatzarbeitern, Geldstrafen, Vertragsstrafen für verspätete Arbeitslieferungen und andere.

Der **indirekte Nutzen** ist nicht unbedingt Teil der ursprünglichen Ziele der Arbeitsschutzmaßnahmen, sondern setzt sich stattdessen aus positive Nebeneffekten zusammen. Durch die Reduzierung von Unfällen können sich somit umfassendere Vorteile auf Unternehmensebene ergeben, wie z. B.:

- gesteigerte Produktivität;
- verbesserte psychische Gesundheit;
- bessere Servicequalität;
- und Reputationsgewinne bei Kunden und anderen Akteuren.

Nationale oder branchenspezifische Programme unterstützen Unternehmen auch oft finanziell zu Arbeitsschutzinvestitionen, jedoch werden generell immer noch Investitionskosten mit Arbeitsschutz verbunden. Die **direkten Kosten** sind die Investitionen die ein Unternehmen für die Durchführung einer Arbeitsschutzmaßnahme machen muss. Dies umfasst unter anderem den Einsatz von Arbeitszeit in die Verwaltung der Arbeitsschutzmaßnahme und die Kosten für Schulungsunterlagen oder neue Ausrüstung. Die **indirekten Kosten** sind unbeabsichtigte Nebeneffekte. Diese können als „Opportunitätskosten“ betrachtet werden. Dies versteht sich in dem Sinne, dass der Zeit- und Ressourcenaufwand für andere umsatzgenerierende Aktivitäten wie die Arbeit an Bauprojekten oder der Entwicklung neuer Geschäftsfelder hätte verwendet werden können.

Mapping nationaler und branchenspezifischer Initiativen zur Arbeitsschutzprävention im Baugewerbe

Insgesamt wurden 107 Initiativen identifiziert sowie Daten zu den mit diesen Initiativen verbundenen Kosten und Nutzen gesammelt. Etwa die Hälfte der identifizierten Arbeitsschutz Programme waren **generische Ansätze zur Bewältigung von Arbeitsschutzrisiken**. Dazu gehören kurze Schulungen, Zertifizierungsprogramme und Kommunikationskampagnen. Ihr Ziel ist es normalerweise, branchenweit Sicherheits- und Gesundheitsverbesserungen zu erzielen. Die andere Hälfte befasste sich mit **spezifischen Arbeitsschutzrisiken und bestimmten gefährlichen Aktivitäten**. Dazu gehören zum Beispiel Programme zur Förderung des Einsatzes von Hebewerkzeugen, Aufklärungskampagnen zur Sicherheit von Gabelstaplern und zum sichereren Arbeiten am Straßenrand während der Instandhaltung von Autobahnen. Für diese Art

von Programmen sind die Erfolgsindikatoren um einiges klarer und leichter zu messen als bei generischen Programmen.

Die folgende Kategorien von Initiativen wurden identifiziert:

- Schulungsmaterialien und Leitfäden;
- Online-Tools / Technologien / Hardware / Apps;
- Zertifikate / Akkreditierung;
- Wissensaustausch, z. B. um Standards / Vorgehensweisen festzulegen;
- Maßgeschneiderte Anleitung / Beratung;
- Versicherungsanreiz;
- Verbesserte Praktiken in der Beauftragung;
- Durchsetzungsinitiative von Vorschriften;
- Und letztendlich Kampagnen mit mehreren Ergebnissen.

Bei der Analyse dieser Initiativen wurden die Nutzen und Kosten der einzelnen Programme ermittelt sowie die besonderen Herausforderungen, mit denen sie sich befassen, hervorgehoben. Zu diesen Herausforderungen gehören physische, mechanische, elektrische, thermische, chemische und psychologische Risiken sowie der dynamische Wandel von Baustellen, der Fachkräftemangel auf dem Arbeitsmarkt und der Einsatz von Wanderarbeitern und letztendlich die Notwendigkeit, Dienstleistungen über Subunternehmer zu erbringen. Diese Herausforderungen beziehen sich auf verschiedene Phasen des Bauprozesses und unterscheiden zwischen verschiedenen Arten von Funktionen innerhalb eines Unternehmens. Dazu gehören **eine unangemessene Bauplanung, unangemessene Baustellenbedingungen, ein unangemessener Baustellenbetrieb, sowie ein unangemessenes Verhalten der Arbeiter**.

Um diese Herausforderungen zu bewältigen, zielen Arbeitsschutzinitiativen häufig darauf ab Informationen an Unternehmen zu vermitteln und / oder die Unternehmen selbst zu ermutigen Zeit in die Einarbeitung und Umsetzung von Arbeitsschutzmaßnahmen zu investieren. Ein weiteres gemeinsames Ziel ist die Einführung einer „Sicherheitskultur“ in Unternehmen, damit die Beratung auch effektiv umgesetzt wird. Tatsächlich ist das Verhältnis von Nutzen zu Kosten von Arbeitsschutzmaßnahmen in Unternehmen mit etablierten Sicherheitskulturen wahrscheinlich höher. **Daher besteht ein klares Geschäftsszenario, dass dafür spricht Baufirmen zu weiteren Investitionen in Arbeitsschutzaktivitäten zu bewegen**.

Ein Rahmenwerk zur Bewertung der Rentabilität von Risikopräventionsmaßnahmen

Das finanzielle Rahmenwerk nimmt eine **einzigartigen Unternehmensperspektive und bietet damit Bauunternehmen ein Tool zur Berechnung der Kosten und Nutzen von Arbeitsschutzinvestitionen**. Das Tool verwendet EU-Statistiken zu Unfällen und Kosten von Arbeitsschutzmaßnahmen als Grundlage. Zusätzliche Informationen kommen von detaillierteren Statistiken aus einer begrenzten Anzahl von Mitgliedsstaaten und Informationen von den 20 EU-Fallstudien. Unternehmer können Kosten und Nutzen von Investitionen in Arbeitsschutz pro Mitarbeiter und optional auf Firmenebene vergleichen.

Grundsätzlich erfordert das Tool nur die Eingabe von allgemeinen Unternehmensmerkmalen und erlaubt optionale Auswahlmöglichkeiten wie Versicherungsschutz und Strafen für verspätete Bauabnahmen. Bereits diese einfachen Eingaben liefern dem Benutzer **die Unfallrate vor und nach Arbeitsschutzinvestitionen** sowie **die Kosten und den Nutzen von Arbeitsschutz-investitionen und deren Differenz**. Darüber hinaus zeigt das Ergebnis die Kosten pro Kostenart, aggregiert über alle Maßnahmen sowie den Nutzen pro Nutzenart (z. B. Vermeidung von

Krankengeld, Kosten am Tag des Unfalls). Erweiterte Benutzereingaben machen das Tool flexibler, aber auch schwerer zu bedienen. Zu den Eingaben, die ein erfahrener Benutzer möglicherweise anzeigen und / oder ändern möchte, gehören:

- Bereits getätigte Arbeitsschutzinvestitionen;
- Investition in Sicherheitsausrüstung;
- Indirekte Nutzenarten;
- Finanzielle Bedingungen.

Die **Nutzen**, die das finanziellen Rahmenwerk beinhaltet, unterteilen sich in direkte Nutzen wie reduzierter Krankenstand und geringere medizinische Kosten (angepasst je nach Versicherungsschutz), weniger Arbeitsunterbrechungen aufgrund von Unfällen, weniger Unfalluntersuchungen (einschließlich Schadensbewertung und Reparaturen), geringere Kosten durch nötige Ersatzarbeitskräfte, weniger Geldbußen und Gerichtsverfahren und schließlich geringere Kosten durch Projektverzögerungen. Die **Kosten** umfassen den Kauf von Sicherheitsmaterialien und Dienstleistungen, die jährlichen Wartungs- und Abschreibungskosten, die Stunden für die Erstvorbereitung durch das Management, die jährlichen Arbeitsstunden für die Überwachung der Maßnahmen, die jährliche Arbeitszeit für die Schulung und letztendlich das Arbeitsschutzmanagement vor Ort durch die Arbeitsschutzbeauftragten.

Das Framework kann hier gefunden werden (Aktuell nur in Englisch):
https://ec.europa.eu/growth/sectors/construction/health-safety_en

Ergebnisse aus den Fallstudien und den Konsultationen mit Interessenvertretern

Insgesamt wurden 20 Fallstudien mit Bauunternehmen aus 15 verschiedenen Mitgliedstaaten durchgeführt. Die Firmen variieren in ihrer Größe und Anzahl von Mitarbeitern. Mehr als die Hälfte der Unternehmen sind KMU. Darüber hinaus decken die Fallstudien verschiedene Baubranchen ab, wie den Bau von Gebäuden, den Tiefbau und andere Bautätigkeiten (z. B. Abbruch- und Elektrotechnik). Dies ist wichtig, da verschiedene Baubranchen unterschiedliche Gesundheits- und Sicherheitsrisiken haben. Die Ergebnisse sind bei einer relativ kleinen Stichprobe von nur 20 Firmen natürlich nicht repräsentativ. Sie ermöglichten es dem Studienteam jedoch, die Parameter für den Finanzrahmen zu testen und praktische Einblicke in Unternehmensspezifische Herausforderungen zu erhalten, sowie in die Lösungen dieser Herausforderungen durch Unternehmenseigene Arbeitsschutzinitiativen.

Die Ergebnisse der Fallstudien zeigen die **Hauptmotive von Unternehmen in den Arbeitsschutz zu investieren** auf. Diese umfassen die Sicherheit der Arbeitnehmer, die Einhaltung von Gesetzen, der Ruf des Unternehmens und die Qualität der Arbeit. Unternehmen beschränken sich jedoch nicht auf einzelne Gründe für Arbeitsschutzinvestitionen und viele weisen darauf hin, dass es schwierig ist, sich auf nur wenige Motive zu beschränken. Die **Risiken für Bauunternehmen** sind im Allgemeinen sehr unterschiedlich, da die befragten Unternehmen in verschiedenen Bereichen des Bauwesens tätig sind. Die am häufigsten genannten Risiken waren jedoch Höhenunterschiede, Kollisionen mit schweren Maschinen, Ausrutschen und Stolpern, allgemeine Fahrlässigkeit, Erkrankungen des Bewegungsapparates, Schnittwunden an Werkzeugen und Stromschläge. Die **Bedürfnissen von Unternehmen** um diese Risiken zuverlässig anzugehen wurden auch genannt. Zum einen braucht es eine bessere Sensibilisierung von Arbeitnehmern für den Arbeitsschutz, eine stärkere Zusammenarbeit und Kommunikation auf Baustellen, und die Schaffung einer generellen Sicherheitskultur im Unternehmen.

In Bezug auf den **Nutzen von Arbeitsschutzmaßnahmen** sind sich die Unternehmen einig, dass die Vermeidung von Unfallskosten durch die Verringerung kleinerer und schwerer Unfälle der Hauptnutzen ist. Darüber hinaus sehen Unternehmen auch Vorteile wie eine verbesserte Effizienz und Produktivität, eine Verringerung der Fehlzeiten von Arbeitern, mehr Projektgewinne und eine kürzere Leerlaufzeit zwischen den Projekten sowie eine Verringerung der Einstellungskosten und der Mitarbeiterfluktuation.

Generell scheint ein Bewusstsein bei Bauunternehmen zu bestehen dass nicht nur die mit Unfällen verbundenen Kosten umfasst, sondern auch die indirekten Nutzen von Investition in den Arbeitsschutz. Allerdings waren sich nicht alle Unternehmen aller möglichen Kosten und Nutzen bewusst. Um dieses Bewusstsein zu stärken und Unternehmer besser zu informieren, wurde daher ein praktisches **Handbuch über Investitionen in den Arbeitsschutz und deren Vorteile für Bauunternehmen** erstellt.

Das Handbuch kann hier gefunden werden (Aktuell nur in Englisch):
https://ec.europa.eu/growth/sectors/construction/health-safety_en

Zusätzlich zu den Fallstudien kamen wertvolle Beiträge aus den Konsultationen mit Vertretern von Interessengruppen aus dem Baugewerbe und dem Arbeitsschutz. Diese Konsultationen wurden in Form von drei separaten Workshops zu den folgenden Themen organisiert:

1. Mapping von Arbeitsschutzinitiativen und Taxonomie von Kosten und Nutzen;
2. Das finanzielle Rahmenwerk und die Fallstudien;
3. Und die Verbreitung und Validierung der Ergebnisse.

Neben der Bereitstellung von Informationen zu den Studienfragen und der Diskussion von Ergebnissen, war eines der Hauptergebnisse hervorzuheben wie schwer und kompliziert die Bewertung der Kosten und Nutzens von Arbeitsschutz auf europäischer Ebene ist. Dies ist auf verschiedene Faktoren zurückzuführen. So sind zum Beispiel langfristige Kosten von Berufskrankheiten und indirekte Nutzenarten wie das Ansehen eines Unternehmens schwer einzuschätzen. Außerdem können die Bedingungen und Situationen zwischen Mitgliedstaaten und Unternehmenstypen stark abweichen. Darüber hinaus wurde in den Konsultationen darauf hingewiesen, dass das Rahmenwerk ausreichend komplex sein muss, um alle wichtigen Faktoren abzudecken, aber gleichzeitig unkompliziert damit Unternehmen es tatsächlich auch nutzen. Letztendlich wird es daher auch notwendig sein, das finanzielle Rahmenwerk im Laufe der Zeit zu aktualisieren und zu erweitern.

Insgesamt waren sich die Branchenvertreter jedoch einig, dass Arbeitsschutz Teil des Gesamtbildes der Geschäftstätigkeit von Bauunternehmen werden sollte. Hierbei soll gerade der Nutzen von Arbeitsschutzmaßnahmen, welcher mehr als nur Unfallvermeidung beinhaltet, mehr hervorgehoben werden. Ein Ziel, das durch das Handbuch und das finanzielle Rahmenwerk unterstützt werden kann.

Abschließende Bemerkungen

Zusammenfassend kann gesagt werden das diese Arbeit ein erster Schritt ist, um Bauunternehmen auf Investitionen in Arbeitsschutz vorzubereiten. Akademiker, Arbeitsschutzbeauftragte und Interessengruppen für den Arbeitsschutz- und für Bauunternehmen sind ermutigt, die Ergebnisse zu verbreiten, zu nutzen und weiter auf ihnen aufzubauen.

Résumé exécutif

Contexte de la question d'étude et de recherche

Le secteur de la construction est le plus grand employeur industriel d'Europe. Il représente 9% du PIB de l'Union européenne et emploie plus de 16 millions d'européens. Même si le secteur abrite plusieurs grandes entreprises multinationales, il se caractérise principalement par une chaîne d'approvisionnement de petites et moyennes entreprises (PME) ainsi que de micro et petites entreprises (MPE). Le secteur est confronté à un certain nombre de défis, qui affectent particulièrement les PME. Un défi spécifique est le manque de travailleurs qualifiés dans le secteur.

Les environnements de travail risqués ainsi que le vieillissement de la main-d'œuvre conduisent à se demander comment le secteur de la construction peut améliorer son attractivité pour les employés potentiels et éviter les départs à la retraite anticipés. **Offrir de meilleures conditions de travail en investissant dans la SST** peut être un pas important dans la bonne direction. Il existe divers dangers physiques (et psychologiques) dans l'industrie de la construction (par exemple : vibrations, bruit, travail en hauteur, manipulation de charges lourdes, exposition à des produits chimiques et à des substances en suspension dans l'air). Par conséquent, de nombreuses interventions sont nécessaires pour atténuer les risques pour la sécurité et la santé. Plusieurs programmes et activités politiques sont en place pour résoudre ces problèmes en améliorant le niveau de santé et de sécurité au travail. Cependant, même si ces actions contribuent à l'amélioration de la santé et de la sécurité au travail (dans tous les secteurs), les efforts concernent principalement le respect de la législation.

Le cadre stratégique européen de SST indique que les MPE et les PME ont des difficultés particulières à se conformer à la législation en matière de SST. Il existe des preuves que les coûts dissuadent la mise en œuvre de méthodes de travail plus sûres dans les petites entreprises. Ainsi, mettre l'accent sur les gains de rentabilité et de productivité et fournir **une analyse de cas pour investir dans des mesures de SST** pourraient inciter les entreprises à améliorer la prévention de la SST. Par conséquent, la recherche sur le développement d'un cadre européen pour évaluer les impacts de la prévention de la SST sur la performance des entreprises de construction pourrait améliorer la SST dans la construction. Il pourrait s'agir d'une étape importante dans la sensibilisation aux avantages de la prévention de la SST. En fait, **la prévention doit de plus en plus être considérée comme un catalyseur de performance.**

Approche de étude et activités menées

Cette étude a développé un cadre européen pour évaluer les impacts de la prévention de la SST sur la performance des entreprises de construction. Dans cette évaluation, l'accent a été mis sur les avantages microéconomiques de la mise en œuvre de la SST, et non sur les avantages sociétaux ou sectoriels. À cette fin, une taxonomie des coûts et des avantages de la prévention de la SST a été créée sur la base d'une recherche documentaire. De plus, l'équipe d'étude a réalisé une cartographie des initiatives nationales et sectorielles liées à la prévention de la SST dans la construction et leurs profils de coûts et avantages. Enfin, un cadre financier a été élaboré pour permettre aux entreprises d'évaluer leurs avantages à investir dans la SST. Le cadre a été validé

dans des études de cas avec des entreprises de construction ainsi qu'en consultation avec les parties prenantes.

Principales conclusions de l'étude

Une taxonomie des coûts et avantages de la prévention de la SST

Les avantages directs des mesures de SST proviennent de la réduction des accidents sur le lieu de travail. Le nombre d'accidents du travail dans les entreprises de construction devrait en principe diminuer après la mise en œuvre des mesures de SST. En termes monétaires, les coûts réduits peuvent être subdivisés en deux domaines: les coûts assurés réduits et les coûts non assurés réduits. Les coûts assurés réduits correspondent aux coûts inférieurs ou non croissants des primes d'assurance en raison d'un nombre réduit d'accidents. Les coûts non assurés couvrent les coûts qui ne sont généralement pas couverts par l'assurance, tels que l'identification des employés de remplacement, les amendes, les pénalités contractuelles pour livraison tardive du travail, et plus.

Les avantages indirects ne font pas nécessairement partie des objectifs des mesures de SST mais peuvent plutôt être caractérisés comme des effets secondaires positifs qui se manifestent. Ainsi, grâce à la réduction des accidents, des avantages plus larges au niveau de l'entreprise peuvent émerger tels que:

- Productivité accrue;
- Amélioration de la santé mentale;
- Meilleure qualité de service;
- Avantages en terme de réputation auprès des clients et des autres parties prenantes.

Bien que les programmes nationaux ou sectoriels puissent contribuer financièrement aux investissements en matière de SST, dans l'ensemble, il existe encore des coûts d'investissement associés à la SST. Les **coûts directs** sont ceux qui se rapportent aux coûts de mise en œuvre d'une mesure de SST. Cela comprend des éléments tels que l'investissement en temps du personnel dans la gestion de la mesure de SST et le coût du matériel de formation ou du nouvel équipement. Les **coûts indirects** sont des effets secondaires imprévus. Ceux-ci peuvent être considérés comme des «coûts opportunistes», ce qui signifie que le temps et les ressources dépensés auraient pu être consacrés à d'autres activités génératrices de revenus, telles que le travail sur des projets de construction ou de nouvelles pistes commerciales.

Cartographie des initiatives nationales et sectorielles sur la prévention de la SST dans la construction

Au total, 107 initiatives ont été identifiées et des données ont été collectées sur les types de coûts et d'avantages associés à ces initiatives. Environ la moitié des programmes identifiés étaient des **approches génériques pour lutter contre les risques de SST**. Il s'agit notamment de formations courtes, de programmes de certification et de campagnes de communication. Leur objectif est généralement d'améliorer la sécurité et la santé dans l'ensemble du secteur. L'autre moitié a **abordé des risques spécifiques en matière de SST et des activités dangereuses**. Ils comprennent des programmes visant à promouvoir l'utilisation de l'équipement de levage, des campagnes d'éducation sur la sécurité des chariots élévateurs à fourche et un travail en bordure de route plus sûr lors de l'entretien des routes. Pour ce type de dispositif, les indicateurs de réussite sont beaucoup plus clairs et, potentiellement, plus faciles à mesurer.

Dans l'ensemble, les catégories d'initiatives suivantes ont été identifiées:

- Matériel de formation et d'orientation ;
- Outils / technologies / matériel / applications en ligne ;
- Certificats / accréditation ;
- Partage des connaissances, par ex. pour établir des normes / approches;
- Orientation / conseils personnalisés;
- Incitation à l'assurance ;
- Amélioration des pratiques de mise en service ;
- Initiative d'application de la loi ;
- Et des campagnes avec plusieurs extrants.

L'analyse de ces initiatives a identifié les avantages et les coûts associés à chaque programme ainsi que les défis particuliers qu'ils visent à relever. Ces défis comprennent les risques physiques, mécaniques, électriques, thermiques, chimiques et psychologiques ainsi que la nature changeante des chantiers de construction, les pénuries de compétences sur le marché du travail et l'utilisation de travailleurs migrants, et enfin la nécessité de fournir des services par le biais de sous-traitants. Ces défis peuvent être classés en différentes étapes du processus de construction et entre différents types de fonctions au sein d'une entreprise. À savoir, une **planification de construction inappropriée, des conditions et des opérations inappropriées sur les chantiers et des comportements inappropriés des travailleurs.**

Afin de relever ces défis, les initiatives de SST visent souvent à transférer des informations aux entreprises et / ou à encourager les entreprises elles-mêmes à investir de manière indépendante, du temps dans les activités de familiarisation et de mise en œuvre de la SST. Un autre objectif commun est également d'introduire une «culture de la sécurité» dans les entreprises afin que les conseils fournis soient effectivement adoptés. En fait, le rapport avantages / coûts sera probablement plus élevé dans les entreprises qui ont des cultures de sécurité bien établies. Par conséquent, **il existe une analyse de rentabilité claire pour inciter les entreprises de construction à investir davantage dans les activités de SST.**

Un cadre pour évaluer la rentabilité des mesures de prévention des risques

Le cadre financier adopte **une perspective d'entreprise unique et fournit aux entreprises de construction un outil pour calculer les coûts et les avantages des investissements en SST**. L'outil utilise des statistiques de l'UE sur les accidents et les coûts des mesures SST. Par ailleurs, il utilise des statistiques plus approfondies sur un nombre limité de pays et les résultats de 20 études de cas à travers l'UE. Il permet aux managers de comparer les coûts et les avantages des investissements en SST par travailleur, et optionnellement au niveau de l'entreprise.

À un niveau de base, l'outil ne nécessite que des entrées de l'utilisateur sur les caractéristiques de l'entreprise et les choix facultatifs tels que la couverture d'assurance et les pénalités pour les retards de livraison. Ces entrées limitées fournissent déjà à l'utilisateur le taux **d'accidents avant les investissements en SST et après les investissements en SST**, ainsi que **les coûts et avantages des investissements en SST et leurs différences**. De plus, le résultat montre les coûts par type de coût, agrégés sur toutes les mesures ainsi que les prestations par type de prestation (par exemple, évitement des indemnités de maladie, coûts le jour de l'accident). L'entrée utilisateur avancé rend l'outil plus flexible mais aussi plus lourd à utiliser. Les entrées qu'un utilisateur plus expérimenté pourrait souhaiter visualiser et / ou modifier comprennent:

- Investissements déjà réalisés ;
- Investissements en équipements de sécurité ;

- Avantages indirects ;
- Besoins financiers.

Les avantages inclus dans le cadre comprennent des avantages directs tels que la réduction des congés de maladie et des frais médicaux (ajustés en fonction de la couverture d'assurance), moins d'heures d'interruption de travail en raison d'accidents, moins d'enquêtes sur les accidents (y compris l'évaluation des dommages et la réparation), la réduction des coûts liés au remplacement des travailleurs, moins d'amendes administratives et de procédures judiciaires, et enfin moins de coûts de retard de projet.
Les coûts inclus sont l'achat de matériel et de services, les coûts annuels de maintenance et d'amortissement, les heures de préparation initiale par la direction, les heures annuelles de surveillance, les heures annuelles de formation et la gestion sur place de la SST par les agents de SST.

Le cadre peut être consulté ici (actuellement seulement en anglais) :
https://ec.europa.eu/growth/sectors/construction/health-safety_en

Résultats des études de cas et des consultations des parties prenantes
Au total, 20 études de cas ont été menées avec des entreprises de construction dans 15 États membres. Il s'agit d'entreprises de toutes tailles, dont plus de la moitié sont des PME. En outre, les études de cas couvraient différents sous-secteurs tels que la construction de bâtiments, le génie civil et d'autres activités de construction (par exemple la démolition et l'électrotechnique), car ceux-ci font généralement face à des risques différents pour la santé et la sécurité. Les informations collectées ne sont de loin pas représentatives avec un si petit échantillon, mais elles ont permis à l'équipe d'étude de tester les données d'entrée pour le cadre financier ainsi que d'avoir un aperçu pratique des défis rencontrés par les entreprises sur le terrain ainsi que les solutions apportées par leurs propres initiatives de SST.

Les résultats des études de cas montrent que **les principales motivations des entreprises à investir dans la SST** sont la sécurité des travailleurs, la conformité légale, la réputation de l'entreprise et la qualité du travail. Cependant, les entreprises mentionnent une grande variété de raisons d'investir dans la SST, nombre d'entre elles indiquant qu'il est difficile de se limiter à quelques motifs. À leur tour, **les risques auxquels sont confrontées les entreprises** varient généralement car ces entreprises travaillent dans différents domaines de la construction. Cependant, ceux mentionnés le plus sont les chutes de hauteur, les collisions avec des machines lourdes, les glissades et les trébuchements, la négligence générale, les troubles musculosquelettiques, les coupures avec des outils et l'électrocution. Afin de faire face à ces risques, **les entreprises indiquent leurs besoins** de sensibiliser davantage les travailleurs à la SST, d'améliorer la coopération et la communication sur les chantiers de construction, et de mettre en place une culture de sécurité globale dans l'entreprise.

En termes d'**avantages des SST,** les entreprises conviennent que l'évitement des coûts des accidents, en diminuant les accidents mineurs et majeurs, est le principal avantage. De plus, les entreprises sont conscientes des avantages tels que l'amélioration de l'efficacité et de la productivité, une réduction de l'absentéisme, l'augmentation du nombre de projets et la réduction des temps morts entre les projets, ainsi qu'une réduction des coûts de recrutement et du roulement du personnel.

En général, les entreprises de construction semblent être conscientes non seulement des coûts associés aux accidents, mais également des avantages indirects d'un investissement dans la SST. Cependant, toutes les entreprises ne sont pas pleinement conscientes de tous les coûts et avantages. Par conséquent, afin de sensibiliser les entreprises et de leur fournir des informations, un **manuel pratique sur l'investissement dans la SST et ses avantages pour les entreprises de construction** a été créé.

Le manuel est accessible via ce lien (actuellement seulement en anglais):
https://ec.europa.eu/growth/sectors/construction/health-safety_en

En plus, des études de cas, des contributions précieuses sont venues des consultations des parties prenantes sous la forme de trois ateliers distincts. Ceux-ci se sont concentrés sur:

1. La cartographie des initiatives de SST et la taxonomie des coûts et avantages ;
2. Le cadre financier et les études de cas ;
3. Et la diffusion et la validation des résultats.

En plus des contributions aux domaines de travail et les résultats présentés ci-dessus, l'un des principaux résultats des consultations avec les parties prenantes a été de **mettre en évidence les difficultés à évaluer les coûts et les avantages de la SST**. Cela est dû à divers facteurs, par exemple les coûts à long terme tels que les maladies professionnelles sont difficiles à prendre en compte, les différences entre les États membres et les types d'entreprises, et la difficulté de mesurer les avantages indirects tels que la réputation. En outre, les consultations ont également montré que le cadre devrait être suffisamment complexe pour couvrir tous les facteurs importants tout en étant suffisamment simple pour que les entreprises puissent réellement l'utiliser. Enfin, il sera nécessaire de mettre à jour le cadre au fil du temps et éventuellement de l'améliorer davantage. Dans l'ensemble, les parties prenantes ont convenu que la SST devrait faire partie du cadre plus large de la conduite des affaires et que les avantages allant au-delà de la réduction des accidents doivent être mis en évidence. Un objectif qui peut être soutenu par le manuel et le cadre financier.

Observations finales

En conclusion, ce travail est une première étape pour préparer les entreprises à investir dans la SST. Les chercheurs, les praticiens et les parties prenantes des SST et des entreprises de construction sont encouragés à diffuser les résultats, à les utiliser et à les développer davantage.

1 Introduction

The construction sector is the biggest industrial employer in Europe. Even though the sector is home to several major multinational companies, it is mainly characterised by a supply chain of small and medium sized enterprises (SMEs) as well as micro and small enterprises (MSEs). The sector is a prime driver of growth and employment. After a period of decline, employment is on the rise again, and expected to increase more over the course of 2015-2025. Furthermore, there is an increase in demand for skills levels, which is expected to even double, following the developments in construction of 'green' and energy efficient buildings.[1]

Parallel to this growth, the sector faces a number of challenges, of which most are especially threatening to SMEs. The Strategy for the sustainable competitiveness of the construction sector and its enterprises ("Construction 2020") identifies (amongst others) the following structural challenges:[2]

1. The shortfall of skilled workers;
2. Low attractiveness to young people due to the working conditions.

Due to low birth rates and rising life expectancy, the proportion of older people in the EU will increase fast. It is expected that in 50 years after 2010 the percentage of people older than 65 will grow from 17.4% to 29.5% while at the same time the EU working age population is expected to decline by 14.2%. These developments put pension and health systems under pressure and make it necessary to keep the elderly as long and healthy as possible at work. As some functional capacities decline with age OSH management is needed in order to keep people working. Next to these demographic changes, the attractiveness of the sector remains low, among others because the sector is still the most risky sector when it comes to fatalities.[3,4] Providing a healthy and safe workplace may increase attractiveness of the sector and attract and retain young workers to the sector.

Several policy programmes and activities are in place to address these issues by improving health and safety standards at work. However, even though these actions contribute to improved health and safety standards (across sectors), the efforts mostly regard legislative compliance and improving OSH conditions. Emphasizing profitability and productivity gains and introducing a business case of competitiveness and sustainable development is much more rare when it comes to reasons for enterprises to invest in OSH measures. Providing a cost-benefit analysis to illustrate the possible benefits of investing in OSH measures is therefore an important step in awareness-raising of the competitiveness and sustainability advantages to OSH prevention. This especially accounts for SMEs, who are generally less well informed about risks and thus more vulnerable to inducing high costs as a consequence of these risks. Prevention should be increasingly viewed as an enabler of performance, in which innovation should be used for the benefit of SMEs.

1 European sectoral trends. CEDEFOP. http://www.cedefop.europa.eu/en/publications-and-resources/publications/8093
2 COM (2012) 433 final. http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2012:0433:FIN:EN:PDF.
3 EUROSTAT, Accidents at work statistics. http://ec.europa.eu/eurostat/statistics-explained/index.php/Accidents_at_work_statistics
4 https://www.inspectieszw.nl/actueel/nieuws/2018/04/17/werknemers-werken-vaak-ongezond-ejn-onveilig

With one of the most risky working environments as well as an ageing workforce that needs replacement, OSH investments can be used as a way to signal attractiveness of construction work to potential employees as well as avoiding early retirement through offering improved working conditions.

The aim of this study is to provide a solid basis for the development of the EU framework to assess impacts of OSH prevention on the performance of construction enterprises, by offering a practical tool, namely a handbook with financial framework.

The study focuses on the micro-economic benefits of implementation, not societal or sectoral benefits. With this information, the implementation of health and safety standards in the construction sector should be improved, such that the sector adheres to working conditions comparable to other sectors of the economy. In the end, we hope to contribute to improving the sector image, such that new cohorts of young people enter and remain working in the construction sector.

Reading guide

Chapter 2 describes the background of the study. Chapter 3 describes a taxonomy of costs and benefits of investing in OSH prevention. Chapter 4 presents the Mapping of national and sectoral initiatives related to OSH prevention in construction and their costs-benefits profile. The detailed mapping is included in a separate Annex. After that, Chapter 5 presents the framework, with its assumptions and instructions for use. Chapter 6 describes the case studies in which we tested the framework. Chapter 7 summarises the stakeholder meetings.

2 Background

2.1 Construction sector

As stated in the introduction, the construction sector mainly consists of SME's. When considering major contractors in isolation, several large multinationals dominate the European market. This is particularly evident in large infrastructure projects, led by major multinational contractors such as, Vinci (France), ACS Construction Group (Spain), Bouygues (France), Skanska (Sweden) and Eiffage (France).[5] However in practice, operation and composition of the sector is characterised by a complex supply chain structure, in which micro and small businesses dominate (the average company has 4 workers).[6]

An important feature of construction is that management of activities is on a temporary site rather than in a factory. This has implications for working practices since tasks are likely to be organised and managed on a site-level basis. New technological developments such as Building Information Modelling (BIM), 3d printing and robotics might allow companies to improve on pre-planning and pre-building whole construction projects, however adoption of these technologies has been slow.[7] The collaborative approach to many construction projects presents opportunities for shared learning and learning across supply tiers (although the fragmentation of the industry has also been seen as a key block to change).[8] Additionally, construction clients can play a major role in the way the construction market operates and through purchasing power and procurement rules can be a facilitator of innovation.[9]

2.2 OSH in the construction sector

Occupational safety and health in the construction area is driven by safety considerations (preventing accidents and diseases), and competitiveness reasons i.e., financial profitability through investing in safety. With one of the most risky working environments as well as an ageing workforce that will need replacement, OSH investments can be used as a way to signal attractiveness of construction work to potential employees as well as avoiding early retirement through offering improved working conditions.

OSH in the construction sector is related to development, promotion, and maintenance of the workplace environment, policies and programs to ensure mental, physical and emotional well-being of employees. At the same time, the workplace should be free from actual or potential hazards that could injure employees.

5 https://www.statista.com/statistics/264430/the-largest-construction-companies-in-europe/

6 http://www.ebc-construction.eu/

7 Roland Berger (2017) Turning point for the construction industry. The disruptive impact of Building Information Modelling (BIM), available at https://www.rolandberger.com/en/Publications/pub_disruptive_impact_of_building_information_modelling.html

8 Wolstenhome, A. (2009) Never Waste a Good Crisis A Review of Progress since Rethinking Construction and Thoughts for Our Future, Constructing Excellence.

9 Innovation, Strategy and Risk in Construction: Turning Serendipity into Capability by Martin Loosemore, 2014. Routledge, London.

There are various physical hazards in the construction industry (e.g., vibration, noise, working at height, handling of heavy loads, exposure to chemicals and airborne substances). Consequently, numerous risk management interventions are necessary to control risks to safety and health. There are often several potential approaches to manage the same risks and there is a number of levers that regulators can utilise to encourage or enforce safer behaviour. Recently, psycho-social risks have received an increased amount of attention in this sector[10,11] as a result of the recognition that the young, male demographic, which is typical to the construction workforce, can be psychologically vulnerable.[12] The European social partners, the European Federation of Building and Woodworkers (EFBWW) and the European Construction Industry Federation (FIEC), have also recognised this and recently held a workshop on this issue as part of the Social Dialogue project (co-financed by the Directorate-General for Employment, Social Affairs and Inclusion (DG EMPL of the European Commission).[13]

According to the European OSH Strategic Framework,[14] micro and small enterprises have particular difficulties in complying with OSH legislation. There is some evidence that costs deter implementation of safer working methods in small companies. An IES study,[15] for which interviews with tools traders were carried out, found that cost was the main barrier to the universal take-up of safer handheld tools. Old-style ground breakers were still reported as being in use, for example, even though they had been superseded by models with much lower vibration levels. Suppliers felt that smaller companies were unlikely to be able to cover the costs of replacing old tools, even when they were exposing workers to unnecessarily high vibration levels when, in all other ways, the tools were fully operational.

Smaller businesses are likely to have more difficulties in resourcing and implementing safety and health policies than larger companies.[16] Having a clear business case is an important motivator. Therefore, there is a need for high-quality economic evidence to evaluate the cost-effectiveness of OSH interventions, especially at the organisational level and in all areas of worker health.[17]

Schemes for small companies

An EU-OSHA report examined the economic aspects of occupational safety and health (OSH) interventions in small and medium-sized businesses (SMEs).[18] Case studies in the existing literature were identified and examined, and thirteen new case studies on OSH initiatives in European SMEs were conducted, with a business case for each intervention prepared according to a common model. Analysis showed the OSH interventions studied were generally profitable, and these new case studies therefore provide a useful tool to allow owners and managers of SMEs an insight into the potential benefits of improving OSH and the key factors involved in carrying out a cost–benefit analysis. Table 2.1 shows examples from the construction sector.

10 http://sustainability.bam.co.uk/health-and-wellbeing/
11 https://www.skanska.co.uk/about-skanska/sustainability/health-and-safety/performance/
12 https://www.theguardian.com/society/2017/mar/17/male-construction-workers-greatest-risk-suicide-england-study-finds
13 http://www.fiec.eu/en/event/mental-health-in-construction-work---fiec-efbww-workshop.aspx?MenID=272
14 http://www.cesi.org/wp-content/uploads/2016/06/PODNIECE-Zinta-European-Commission-EN.pdf
15 http://www.hse.gov.uk/research/rrpdf/rr843.pdf
16 https://osha.europa.eu/sites/default/files/seminars/documents/15%20EU-OSHA%20D%20Elsler_The%20business%20case%20for%20OSH_EN_0.pdf
17 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5794237/
18 https://osha.europa.eu/en/publications/reports/the-business-case-for-safety-and-health-cost-benefit-analyses-of-interventions-in-small-and-medium-sized-enterprises/view

Table 2.1. Examples of OSH initiatives in SMES in the construction sector

Sector	Short description of the intervention	Results	Payback period (years)
Construction (floor coverings)	Training in correct lifting, exercises, lifting equipment, reminders about safe lifting, incentives (from health insurance)	Reduction in back pain and sick leave due to back pain.	2.16
Construction (houses)	Individual visits from a physiotherapist, a rest break tool, training (in empowerment)	Reduction in musculoskeletal disorders and related absenteeism	<1.00
Construction (window panes)	Renting equipment for handling window panes during deliveries (charged to customers)	Elimination of absenteeism due to occupational accidents and ill health, improved productivity.	2.62
Construction (agriculture)	Implementation of equipment to reduce physical strain in load handling	Reduction of related incidents, improvement in quality of work	<1.00
Construction	Automatisation through provision of equipment	Reduction in accident risks and physical strain, improvement in productivity	3.20
Construction (pipes, houses)	Use of a material lift, continuous training, OSH awareness raising initiatives.	Productivity raised by up to 30 %, improvement in quality of work and working conditions (noise, dust), reduction in sick leave	1.31

Source: EU-OSHA, 2014.

However, the study concluded that investment in OSH is not always financially beneficial and "like any other type of investment, it might be economically profitable or not, depending on some key factors, as well as on how the financial effects of the intervention are measured."

For clarity on the issue, further analysis into the costs and benefits of OSH measures is needed. This analysis serves to generate a solid basis for the development of a framework to assess the impact of investment in OSH prevention on the performance of construction companies.

3 Taxonomy of the costs and benefits of OSH prevention

In this chapter a taxonomy of costs and benefits to OSH prevention is presented. To begin, an overview of the general approach to the measurement of the costs and benefits related to OSH interventions is presented, followed by an analysis of the subcategories of direct and indirect impacts.

3.1 Introduction to the taxonomy of costs and benefits of OSH initiatives

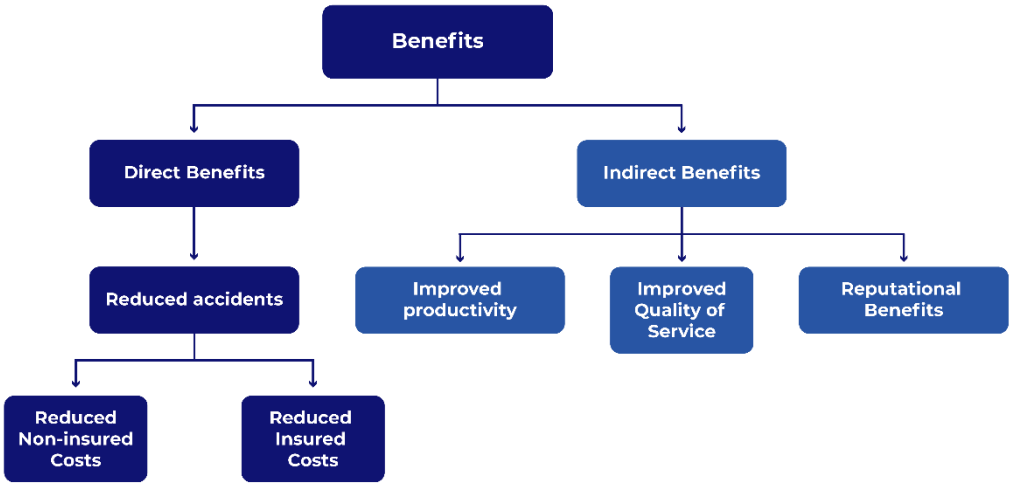
At its core, the logic of applying costs and benefits analysis to assess the performance of organisational actions, such as OSH initiatives, is conceptually straightforward; after identifying the monetised costs and benefits of a proposal in the present day value, one can determine whether the costs outweigh the benefits. If not, there is a commercial rational to implement the initiative considering that the benefits will likely add value to the company bottom line.

Of course, this analysis can be done by comparing several different courses of action against the 'do nothing' option, to clarify which route forward would likely achieve the greatest level of benefits considering the costs. However, when undertaking a cost benefit analysis, there is often debate around which types of costs and benefits should be included in the analysis, and from which perspective the costs and benefits should be measured.

In this case, a company-level perspective was used to determine the costs and benefits of implementing OSH initiatives in the construction sector. Therefore, only the costs and benefits incurred by the businesses themselves were considered even if OSH related impacts were experienced by other actors, such as the public health services or employee' family members.

In addition, the costs and benefits measured include all that impact firm performance, meaning that the direct and indirect effects were considered. Some of the impacts documented had an "intangible character" meaning that they were difficult to measure in monetary terms. Figure 3.1 provides a summary taxonomy of the relevant 'higher level' benefits in scope.

Figure 3.1 Summary taxonomy of the relevant 'higher level' benefits resulting from OSH initiative implementation



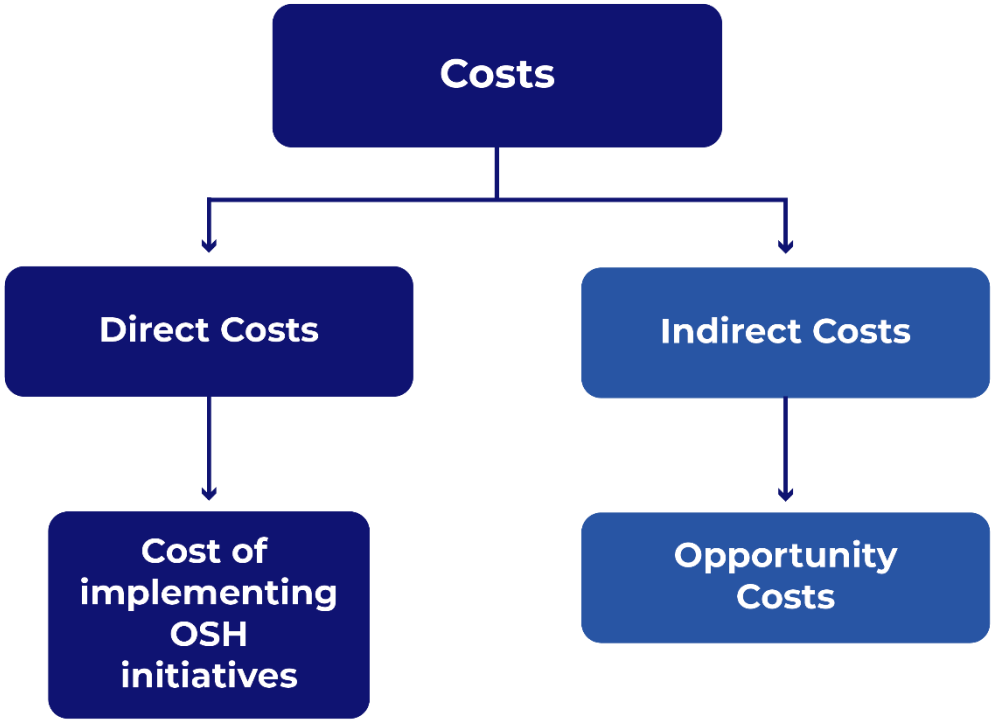
As can be expected, in the framework of the taxonomy, the **direct benefits** of OSH initiatives stem from the reduction in work place accidents. Therefore, after exposure to OSH initiatives, the number of accidents that are experienced by construction companies should be reduced. In other words, in monetary terms, the direct benefits equate to the counterfactual reduction of the costs resulting from the accidents that have been avoided (it does not mean necessarily that all accidents will be avoided but that some of them should have if the OSH initiatives have been followed).

These reduced costs can be subdivided into two areas: reduced insured costs and reduced non-insured costs. The reduced insured costs correspond to the lower or non-increasing costs of the insurance premiums that companies experience due to the reduced number of accidents. Whereas, the non-insured costs cover the costs not typically covered by insurance when accidents occur such as identifying replacement employees, fines, contractual penalties for late work etc.

The **indirect benefits** are those that result from the 'knock-on effects' of the OSH initiatives in reducing work-place accidents. In this case, the benefits that emerge are not necessarily part of the objectives of the OSH initiatives but rather they can be characterised as positive side effects that emerge incidentally. Thus, through the reduction in accidents, wider firm-level benefits may emerge, such as enhanced productivity, improved quality of service, and reputational benefits with clients and other stakeholders.

Figure 3.2 provides a summary taxonomy of the relevant 'higher level' costs in scope.

Figure 3.2 Summary taxonomy of the relevant 'higher level' costs in scope.



Source: Ecorys.

According to the taxonomy proposed, the **direct costs** are those that relate to the costs of implementing an OSH initiative. This includes items such as the investment of staff time in managing the OSH initiative and the cost of any training materials or new equipment.

The **indirect costs** are unintended negative knock-on effects that are passed-on to the companies as a result of funding and/or participating in OSH initiatives. These can be considered as 'opportunity costs' meaning that the time and resources spent could have been dedicated towards other revenue generating activities, such as working on construction projects or new business leads.

For each of the cost and benefit impact categories indicated above, the following sections provide a detailed analysis of their scope identified via the reviews of the literature. However, prior to expanding-on these impact categories, a summary is presented on the general working conditions in the construction sector and the rationale for supporting strengthened standards around health and safety in this industry.

Working conditions in the construction sector

The consequences of the comparatively challenging working conditions facing construction employees in the EU are well-documented. According to Eurostat's *Accidents at work statistics,* of the 3876 reported fatal accidents at work in the EU in 2015, 21% (or 814) were in the construction sector; similarly, a proportion of 23% was identified for the 3.2 million non-fatal accidents. In both cases, the construction sector had the largest share of accidents compared to any other sector.[19]

[19] https://ec.europa.eu/eurostat/statistics-explained/index.php/Accidents_at_work_statistics

Of course, these outcomes partly stem from the fact that construction is Europe's largest industrial employer, accounting for 12.7 million employees cumulatively across the subsectors of construction of buildings, civil engineering and specialised construction activities in 2016.[20]

However, evidently, the health and safety risks for construction sector employees pose comparatively greater dangers, with key challenges falling into the following categories:

1. **Mechanical risks**: falls from height, tripping, slipping, trench collapse, scaffold collapse, hit by falling materials or mobile machinery;
2. **Electrical risks**: shocks, electrocutions or burns from tools, equipment and installations;
3. **Thermal risks**: burns from misuse of heated or high temperature equipment, tools and installations;
4. **Physical risks:** working in noisy or high temperature environments, using or being exposed to tools and (heavy) machinery that generate noise, vibration and have the potential to cause injury if misused, physical overload, repetitive motion injuries, musculoskeletal disorders, exposure to dust, and accidents due to not using personal protective equipment or safety guards;
5. **Chemical risks:** exposure to hazardous and airborne substances, poisoning, danger of explosions;
6. **Psychological risks:** stress, depression, Post Traumatic Stress Disorder (PTSD) and suicide.[21], [22]

The on-going physical transformation of construction sites represents a further key challenge to be managed. During construction projects, the dynamic nature of the work site causes the health and safety conditions to change and evolve, exposing workers to different types and levels of risks, therefore reducing the effectiveness of traditional enforcement mechanisms such as site inspections by authorities; this is unlike fixed work places, such as factory production lines, where the risks can be more easily controlled.[23]

When compared to other sectors, other differences include the "macho" culture associated with the predominantly male working environment, with key features of this behaviour including a lower recognition of the importance of good health and safety practices, avoidance of seeking support when needed, risk taking, and the need for workers to prove themselves physically.[24]

Moreover, the business structure of the construction industry is likely to cause some challenges in maintaining good health and safety standards. The sector contains a high proportion of micro, small and medium sized enterprises, with 99.9% of construction firms falling into these categories, according to the European Builders Confederation (EBC). The evidence suggests that smaller businesses are likely to have more difficulties in resourcing and implementing safety and health

[20] https://ec.europa.eu/eurostat/statistics-explained/index.php?title=File:Sectoral_analysis_of_key_indicators,_construction_(NACE_Section_F),_EU-28,_2012_A.png

[21] https://www.osha.gov/Publications/OSHA3252/3252.html

[22] Buicaa, G., Antonova, A.E., Beiua, C., Pasculescub, D. & Remusb, D. (2017), Occupational health and safety management in construction sector - the cost of work accidents, Calitatea, Jan 2017, Vol.18(S1), pp.35-40.

[23] Weil.D (2001) Assessing OSH performance: New evidence from the construction industry. Journal of Policy Analysis and Management, Vol. 20, No. 4, 651-674 (2001).

[24] DAVID IACUONE (2005) "Real Men Are Tough Guys": Hegemonic Masculinity and Safety in the Construction Industry. The Journal of Men's Studies, Vol. 13, No. 2, Winter 2005, 247-266.

policies than larger companies.[25] In 2017, the EBC suggested that one third of micro-firms in the construction sector did not assess on-site safety risks.[26]
A further issue that heightens the safety risks relates to the contractual methods of engaging individual site workers. While there are country by country differences, workers may be contracted on a short-term basis, linked to specific project activities, resulting in a lack of a long-term focus on improving health and safety standards.[27] Similarly, another study documented that the construction industry workforce is largely composed of unregistered and nonunionized subcontractors that are often associated with poor health and safety attitudes and practices.[28]

Additionally, the construction sector is often characterised by its higher proportion of migrant workers that may have lower levels of awareness of the safety norms in their host countries, may not have the necessary language skills to effectively engage with safety materials and training classes, and may be hired for comparatively riskier jobs than their colleagues.[29]

Given that these conditions increase the likelihood of workplace accidents, the rationale to promote OSH interventions in the construction sector is self-evident. Moreover, in the following section we highlight how strengthened health and safety practices can strengthen company financial well-being.

3.2 Direct benefits

The intention of OSH initiatives is to change manager and employee attitudes, behaviour, and working practices so that the potential for negative health and safety outcomes is reduced; therefore, in monetary terms, the direct benefits result from the costs of the accidents avoided.

Considering that the direct benefits represent the avoidance of negative incidents resulting from poorer working conditions, this section indicates the types of concerns that OSH initiatives aim to ameliorate to produce healthier and safer working environments.

Reduced insured costs

As one would expect, a review of the literature on the costs and benefits of health and safety initiatives in the construction sector revealed that the key direct benefit of their successful implementation is the reduction in the number of workplace accidents.

From a company level perspective, the reduction in work place accidents can lead to the reduction in insured costs, as follows:

Reduced insurance premiums: the frequency and value of claims made for work-place accidents by construction companies is a key determinant of the cost of the premiums for employer and public liability insurance; therefore, reducing the need for holders to use their insurance coverage will result in financial savings. While insurance policies are typically designed to cover numerous

[25] https://osha.europa.eu/sites/default/files/seminars/documents/15%20EU-OSHA%20D%20Elsler_The%20business%20case%20for%20OSH_EN_0.pdf
[26] EBC (2017) Annual Conference: Final Programme.
[27] Bruce Nissen (2008) Immigrant Construction Workers and Health and Safety. Labour Studies Journal. Volume 33 Number 1.
[28] David Snashall (2005) Occupational Health and Safety in the Construction Sector.
[29] Bruce Nissen (2008) Immigrant Construction Workers and Health and Safety. Labour Studies Journal. Volume 33 Number 1.

eventualities, we have highlighted a series of further cost categories that may be borne by the companies themselves if they lack the specific insurance coverage for such items.

Avoidance of damaged property: accidents can lead to damaged property including the buildings / site preparations under construction, adjacent property owned by third parties, and construction equipment; insurance policies are available to construction companies to cover such eventualities.

Prevention of compensation and litigation: employees, employee' families or subcontractors may demand compensation if their illness is due to a workplace accident, for example, for loss of earnings, health costs or funeral costs. Such claims may advance to litigation procedures if disputed. Again, eventualities like these are typically covered by the company insurance policies up to a limit specified.

Reduction in project delays and contractual penalties: major accidents can result in project delays that are due to accidents. Contracts with clients often include clauses known as liquidated and ascertained damages (LADs) that demand payment of penalties if deadlines agreed are not met corresponding to the level of income lost by the client on a per day basis. Large contractors are likely to have insurance coverage for such items, however, the level of coverage provided may vary and would unlikely extend to damages that would be deemed unreasonable.

Considering that the costs of serious accidents can escalate across several dimensions, construction companies are heavily dependent on insurance protection. Therefore, the literature suggested that the construction sector should consider investment in health and safety practices as a strategy to help reduce escalating insurance premiums.[30] The following section provides some further details on the importance of insurance protection in the construction sector.

Reduced insurance premiums

Insurance providers offer several types of products that enable the construction sector to meet its statutory and client obligations and minimise risks, with the main ones including:

- **Contractors all risk insurance** covers damage to property, building materials and equipment including in instances of construction faults or negligence, and third-party injury or damage claims including sub-contractors. This type of insurance covers risks not typically covered by other types of construction sector insurance and is a "non-standard" product in the sense that the premiums do not reflect standard or preferred rates. Unlike the other insurance policies mentioned below that offer monthly or annual protection, contractors all risk insurance is typically taken out on a per project basis and can be used as a marketing tool to attract potential customers;
- **General liability insurance** is less comprehensive than contractors all risk insurance, but covers protection against damages to third party property and subcontractor personal injury and provides on-going business insurance protection. Other forms of this type of insurance include public liability insurance and construction liability insurance;
- **Employers liability insurance** is normally mandated by law and compensation to employees if they are injured or ill due to the work they perform for their employer;
- **Commercial vehicle insurance** is normally mandated by law and protects against employee and third-party vehicle and personal injury damages, with additional coverage provided where vehicles are used on construction sites;

[30] Bruce Nissen (2008) Immigrant Construction Workers and Health and Safety. Labour Studies Journal. Volume 33 Number 1.

- **Professional indemnity insurance** is less relevant to the protection of claims due to workplace accidents and typically covers legal liability for advice and design services provided, and protection against breaches of professional duty.

The combination of insurance products selected by contractors may differ according to their individual and client needs and national practices and requirements. Moreover, contractors may aim to spread the risks of workplace accidents across several policies that provide similar types of coverage to reduce their overall premium costs.[31]

However, according to one study, it should be stressed that insurance companies that offer policies to the construction sector tend to set their premiums according to the performance of several company variables that are sensitive towards the extent of accident frequency.[32]

The most pertinent variable that insurance companies examine is the project hazard level, which was mentioned as being directly correlated to the frequency and severity of accidents, and therefore the amount of compensation likely to be paid. The project hazard level is based on an assessment of the project scope, considering the extent of the planned performance of dangerous activities such as demolition, explosive works, excavation, working at height, use of heavy machinery, working in confided spaces etc.

The second most important variable is the size of the wage roll. Higher premiums by value are demanded of larger employers considering the increased propensity for accidents, although the rate per employee may be comparatively lower when compared to the premiums for smaller firms.

Thirdly, insurers recognise that the perceived effectiveness of the planned safety management system is instrumental in reducing on-site accidents and therefore reducing claims. Although, the potential risk of construction companies not implementing their health and safety plans in practice was also regarded as a key factor to consider.

Finally, the company claims history over the previous years provided an essential guide to determining the value of the premiums to be set. Interestingly, insurers indicated that companies with claims that were high in frequency but low in injury severity were subject to higher premiums than companies with claims that were low in number but high in injury severity.

Interestingly, in terms of the size of contractors, it was mentioned that large companies were not automatically favoured over smaller companies. Even though it was recognised that large companies were more likely to use less hazardous construction methods, main contractors frequently hire subcontractors to perform activities on their projects. Therefore, considering that accidents often involve subcontractors, the previous history of managing the health and safety outcomes of all site workers was a factor to be considered when setting insurance premiums.

Clearly, the methods used to set insurance premiums are strongly linked to the perceived likelihood of potential on-site accident risks. Therefore, the construction sector has a commercial interest in investing in OSH initiatives to obtain lower insurance premiums.

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31 Kamardeen, I. (2009) Critical Factors for Insurance Premium Computation in Construction. Architectural Science Review. Vol 52, Issue 1.

32 Ibid.

Reduced non-insured costs

When accidents occur, contractors will be exposed to a range of non-insured costs that they will need to pay directly from their pay roll and other sources. Through the implementation of OSH initiatives, costs like these could be avoided or reduced, for example:

Reduced authority inspections and fines: these costs were considered uninsured costs in the analysis. This was done because fines issued by authorities are typically not covered unless companies have specifically requested this type of protection, even though many employer liability or public liability policies provide some form of protection against legal representation and prosecution costs,.

Evidently, serious accidents are likely to result in site inspections by the authorities that will involve face to face and reporting inputs performed by managerial, supervisor and clerical staff, and possibly hourly rate charges issued by the inspectorate. More than likely, requests will be made to strengthen health and safety practices on-site and possibly across the company, which should have been established prior to the accident. In serious cases, fines may be issued by the authorities. Where negligence has occurred, construction company managers may face judicial proceedings.[33,34,35]

Reduction in personnel costs: when accidents occur, employee and subcontractor costs can escalate. This includes instances where the employees injured can continue to receive normal salary payments while off work for the period not covered by company insurance; the costs of wages to those not injured that helped the injured parties or experienced delays due to the accident; the time spent by the main contractor to identify and provide instructions to the replacement personnel or subcontractors so that the work may continue; the newly assigned employees or subcontractors will need to familiarise themselves with the job, or receive company training, meaning that they are initially less efficient resulting in higher costs; employee overtime rates may need to be paid if deadlines are to be kept; when the injured person returns to work, they may be less efficient for a period of time.

Reduction in property, material and equipment costs: while damage to building materials and equipment can be covered by insurance policies, additional time will be spent on reordering and reorganising damaged equipment and materials so that production can resume. Similarly, although damaged property such as the building under construction can be covered by insurance policies, remedial work will need to be undertaken.

Other items: some construction contracts are designed to credit companies with bonuses if accidents are avoided. Therefore, in some cases, managers may be financially incentivised to limit accidents on-site.[36]

[33] Ikpe, E., Hammon, F., & Oloke, D. (2012), Cost-benefit analysis for accident prevention in construction projects, Journal of Construction Engineering and Management, pp 991-998.

[34] https://www.jlt.com/industry/construction-insurance/constrution-insights/the-increasing-cost-of-health-and-safety-prosecutions

[35] Buicaa, G., Antonova, A.E., Beiua, C., Pasculescub, D. & Remusb, D. (2017), Occupational health and safety management in the construction sector - the cost of work accidents, Calitatea, Jan 2017, Vol.18(S1), pp.35-40.

[36] Netscher, P. (2014) Successful construction project management: The practical guide.

3.3 Indirect benefits

While OSH initiatives specifically aim to reduce the number of workplace accidents, improvements in company health and safety conditions can lead to a range of other positive 'knock-on effects' that indirectly add value to the bottom line. In this section, several indirect benefits of OSH initiatives are reviewed including the potential for enhanced productivity, improved mental health and improvements in the quality of service provision etc.

Enhanced Productivity

The literature reviewed suggested that OSH initiatives and investment in strengthened health and safety practices not only result in a reduced number of accidents, but can also indirectly lead to enhanced levels of company productivity.

For example, using financial data collected via a survey of construction firms, a study performed a cost benefit analysis of investment in accident prevention measures to identify the range of cost impacts on turnover. The study identified that for every £1 invested in measure to strengthen health and safety at work, companies gained £3 of direct and indirect benefits, with improvements in firm productivity representing one of the main indirect benefits contributing to this outcome.[37]
Using a case study approach to the assessment of OSH initiatives that included the construction sector, the European Commission's "benOSH" study reviewed a series of prevention measures that aimed to reduce work place accidents to mitigate musculoskeletal disorders (MSDs), slips, trips and cuts, aggressive behaviour of customers, dust inhalation etc. While the implementation of the OSH initiatives was reported to result in the reduction of accident related costs, wider company improvements were reported, included strengthened firm productivity.[38]

As part of a study on the relationship between firm productivity and health and safety standards, a case study on a Finnish OSH initiative noted that there was a statistically significant correlation between the quality of health and safety outcomes on construction sites and firm profit margins. It was found that only firms that had obtained very good on-site health and safety standards could realise profit margins of 10% or more.[39]

Productivity gains resulting from OSH initiatives have been linked to several key drivers. Most obviously, is the ability of construction companies to hold on to staff that have not been (fatally) injured, meaning that their skills and experience can be retained and further developed by the company without having to identify replacements or duplicating training efforts.[40]

However, workplace accidents can have wider negative effects on overall staff retention rates. According to another study on SMEs in the Polish construction sector, health and safety inspectorates had noted that companies with poorer health and safety standards tended to have higher staff turnovers, therefore limiting firm performance across several dimensions.[41]

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37 Ikpe, E., Hammon, F., & Oloke, D. (2012), Cost-benefit analysis for accident prevention in construction projects, Journal of Construction Engineering and Management, pp 991-998.

38 European Commission (2011) benOSH: Socio-economic costs of accidents at work- and work-related ill health.

39 De Greef, M. (2004) Quality of the working environment and productivity. Research findings and case studies.

40 Hughes, P. (2011). Introduction to Health and Safety in Construction. Routledge, London.

41 Dabrowski (2015) An investigation and analysis of safety issues in Polish small construction plants. International Journal of Occupational Safety and Ergonomics (JOSE), 2015 Vol. 21, No. 4, 498–511.

Similarly, companies with lower health and safety standards tend to suffer more with staff that are recurrently absent from work, otherwise known as absenteeism. While the causes of absenteeism are highly multidimensional, on-site safety issues have been documented as a key explanation of this phenomenon. For example, a study that collected survey data on construction site workers reported that 21% cited personal illness and injuries and 4% personal safety concerns as being the main causes of their absence from work.[42] Seemingly, a quarter of staff that suffers from absenteeism would benefit from stronger health and safety company cultures.

Good health and safety standards have also been recognised to boost productivity through increased staff morale and well-being.[43] Equally, case study research on manufacturing and construction companies documented that safe and well-assembled production practices and systems had the effects of improving worker efficiency and motivation, and lowering stress, thereby strengthening productivity.[44]

Another factor impacting company productivity, worker output quality and employee' long-term quality of health is the issue of presenteeism, defined as the phenomenon of employees attending work while ill. This trend has been considered as intensifying due to the shift in employment practices towards greater job insecurity, peak periods, and streamlined staffing methods leading to greater personal responsibilities.[45,46]

Regarding the construction sector specifically, a study on the role of managers in the civil engineering sector suggested that presenteeism was a dominant characteristic of the working ethos, given the competition between professionals, and the fact that it was difficult to evade responsibility at any time. This was reported as taking a heavy toll on the physical and mental health of employees.[47]

Improved mental health

Although related to the issue of productivity, poor mental health in the construction sector has been recognised as an emerging problem that may have been overlooked specifically by traditional OSH initiatives that focus mainly on accident avoidance.

According to the Office for National Statistics UK, the prevalence of suicide in the construction sector is 1.6 times higher when compared to the national sectoral average. In terms of the highest risk subsectors, roofers, tilers and slaters were 2.7 times higher at risk than the UK average. Industry analysts commented that the "macho" culture and the "hire and fire" approach to engaging employees placed additional strain on vulnerable persons.[48]

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42 Sichani, M. (2011) Understanding construction workforce absenteeism in industrial construction. Canadian Journal of Civil Engineering. 38: 849–858 (2011).

43 G. Smallman, G. John, 'British directors' perspectives on the impact of health and safety on company performance', Safety Science, 38, 2001, p. 229.

44 Tuinzaad, G. (2000) The right track for ergonomics in assembly work? Comparison between two production concepts on ergonomics and productivity', NIA-TNO, Hoofddorp.

45 Institute of Employment Studies (2016) Presenteeism: A review of current thinking.

46 Attempts to measure presenteeism have largely revolved calculating the reduced number of hours worked given the reduced levels of productivity, with extrapolations made to the macro-economic level. However, although putting a monetary value on presenteeism faces methodological challenges, the evidence suggests it is worth taking seriously by managers given that substantial negative cost impacts are felt by companies, and thus the wider economy.

47 Watts, Jacqueline H. (2012). Women working in construction management roles: is it worth it? Global Journal of Management Science and Technology, 1(3) pp. 38–44.

48 Construction News (2017) Suicide statistics 'a wake-up call' for construction. Available at: https://www.constructionnews.co.uk/data/industry-barometer/suicide-statistics-a-wake-up-call-for-construction/10018567.article

A study examining patient data compared the prevalence of persons in the construction sector to request help from medical professionals to those in other sectors. The results showed that construction workers were less likely to request support for general mental health issues such as depression from GPs, but were more likely to experience Post Traumatic Stress Disorder (PTSD) and seek support from psychiatrists. It was suggested that construction site workers tend to avoid health professionals regarding mental health issues unless they experience very severe problems.[49]

An evaluation of an OSH initiative aimed at raising awareness of mental health issues and preventing suicide in the construction sector suggested that such initiatives could have modest impacts around changing behaviours and beliefs. Based on an analysis of large-scale survey data of construction employees at the ex-post and ex-ante phases, those participating in the programme were noted as experiencing modest changes in their attitudes, particularly around recognising that mental health was a problem in the construction sector and should be addressed by better working conditions practices.[50]

Enhanced quality of service provision

The literature reviewed suggested a likely relationship between health and safety standards and the (perceived) quality of service provision.

For example, a study that used regression analysis to examine the relationship between construction safety (number of accidents reported) and quality performance (number of defects reported) noted that there was a positive relationship between these variables. While it was difficult to assume causality, qualitative feedback from managers indicated that leadership practices, learning lessons, on-site planning, not rushing reworks when defaults were identified, establishing quality and safe processes, establishing pride in the tidiness of the site and the work produced, all mutually reinforced standards around quality and safety.[51]

Similarly, based on an analysis of survey data of 321 customers that had received electrical utilities installation services, it was found that customer satisfaction was significantly lower in instances where employees had experienced accidents. In addition, another separate independent variable, “safety climate”, was tested that was based on customers’ perceptions of the safety of the installation activities. These two variables, number of accidents and safety climate, accounted for 53% of the variance in the outcome variable, customer satisfaction. Therefore, it was suggested that there was a likely spill-over effect between workplace safety and the perception of the quality of the services provided.[52]

Stronger organisational reputation

Recognition of good health and safety standards are also likely to result in organisational reputational benefits in the market place.

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49 Stocks, R (2010) The incidence of medically reported work-related ill health in the UK construction industry. Occupational and Environmental Medicine, Vol. 67, No. 8 (August 2010), pp. 574-576.

50 King, T. L., Gullestrup, J., Batterham, P. J., Kelly, B., Lockwood, C., Lingard, H., Milner, A. (2018). Shifting beliefs about suicide: Pre-post evaluation of the effectiveness of a program for workers in the construction industry. International Journal of Environmental Research and Public Health, 15(10), 2106–2119.

51 Wandberg, J. (2013) Relationship between Construction Safety and Quality Performance. Journal of Construction Engineering and Management. Volume 139, Issue 10.

52 P.G. (Willis) Does employee safety influence customer satisfaction? Evidence from the electric utility industry. Journal of Safety Research, Vol 43, Issues 5-6.

If serious accidents occur, a range of negative firm reputational impacts could result including media scrutiny, negative public opinion, unwanted pressure group involvement, reduced sales and profit, and unwanted expenditure on public relations activities.[53]

Similarly, it has been documented that construction firms should not underestimate the negative effects of accidents on their reputation. For example, poor safety records can result in (sub)contractors being blacklisted by clients, company market positioning can be negatively affected and takes years to rebuild, and on-site accidents can lead to additional work and hassle for developers that need to maintain their own safety record, leading to selection of other service providers in the future.[54]

3.4 Direct costs

Company costs of following an OSH initiative

Companies that wish to implement OSH initiatives are exposed to additional management and implementation costs than would be incurred normally. It was mentioned in the literature that for many construction companies, expenditure on extra health and safety activities can often seem detrimental to short term profitability, therefore promoting health and safety investments requires communication of the longer-term benefits.[55]

The extent and types of costs incurred will vary significantly depending on the focus and scale of the OSH initiative to be implemented, with specific items including:

- Staff time with the costs varying per hour for the different professional levels involved, with activities including:
  - Inputs from managers, supervisors, health and safety coordinators, site-workers, subcontractors, administrative staff;
  - OSH initiative planning, design and communication activities;
  - OSH initiative administration and implementation;
  - Participation in OSH initiatives, such as training and seminars;
  - Implementing the updated techniques in practice;
  - Monitoring, reporting, review, system improvement and follow-up activities.
- Costs of materials, equipment and services used to strengthen health and safety standards:
  - Training materials;
  - Investment in, and maintenance of, new safer personal protective equipment, clothing, machinery and tools;
  - Provision of advisory services, training, auditing and certification activities by third parties;
  - Medical check-ups and testing.[56]

[53] British Safety Council (2014) The business benefits of health and safety: A literature review.
[54] Netscher, P. (2014) Successful construction project management: The practical guide.
[55] Cant, D. (2014) What are the benefits of health and wellbeing in construction? Vertias, UK.
[56] Rzepecki, F. (2012) Cost and Benefits of Implementing an Occupational Safety and Health Management System (OSH MS) in Enterprises in Poland, International Journal of Occupational Safety and Ergonomics (JOSE) 2012, Vol. 18, No. 2, 181–193.

3.5 Indirect costs

This section presents the indirect costs for companies when following OSH initiatives, namely these are the “opportunity costs” of choosing to invest resources in strengthening company health and safety standards that could been invested in other types of commercial activities.

Opportunity costs

In the Cost Benefit Analysis (CBA) literature, the item of “opportunity costs” is a factor that is typically accounted for when performing assessment of the indirect costs of interventions.[57]

Opportunity costs can be defined as the indirect losses incurred due to the allocation of time and monetary resources in OSH initiatives. Such investments should be considered as those that are in addition to those that are legally mandatory.[58] Therefore, the opportunity costs are the loss of benefits that could have been realised by using the company resources in a different way.

For example, instead of investing in health and safety training, resources could have been allocated on another form of staff skill development that would have been beneficial to the company due to the potential for stronger revenue accumulation. Alternatively, the money could have been spent on sales or tendering activities, meaning that the company could have secured more contracts. In both examples, there could have been potential for developing further revenue by going down either of these routes, suggesting further loss of benefits.

Therefore, CBAs should attempt to account for any indirect costs incurred to gain a complete picture of the effects of opting to follow an OSH intervention.

[57] J, Rouwendal (2012) Indirect effects in Cost Benefit Analysis. Journal of Costs Benefits Analysis. Vol 3. Issue 1.

[58] Thiede, I. (2015) Quantifying the costs and benefits of occupational health and safety interventions at a Bangladesh shipbuilding company. Int J Occup Environ Health. 21(2): 127–136.

4 Mapping of OSH prevention initiatives and cost-benefit profile

In this chapter, the mapping of initiatives related to OSH prevention in construction is presented. Following this mapping, an analysis of the OSH initiative causal chain is set-out, that highlights the pathway from the initial investment in OSH initiative implementation to the longer-term benefits for company performance. The full list of identified OSH prevention initiatives is presented in Annex 6.

4.1 Mapping of national and sectoral initiatives on OSH prevention in construction

The aim of the mapping is to identify and map relevant initiatives at national, as well as sectoral level, addressing the economic aspects of OSH prevention in construction.

A total of 107 initiatives were identified. It is distinguished between general and specific/targeted approaches on the basis of the scope of the scheme.

1. Generic approaches to tackle OSH risks

These account for around half of the schemes and include short training courses, certification schemes and communications campaigns. Their aims are usually to bring about safety and health improvements across the sector. This may be mediated through multiple risk reduction activities within companies.

Many initiatives aimed to **drive up OSH standards** in smaller construction companies in a general sense. Often these were developed as a reaction to national statistics showing accidents of all types were disproportionately more likely to happen in SMEs. Activities would typically be **inclusive of many sub-sectors in construction and many construction activities**. These might include training schemes covering many aspects of OSH or, alternatively, multiple, parallel campaigns each addressing a different type of hazard. The mechanisms of change and criteria for success were more complex to define in these cases.

2. Approaches to tackle specific OSH risks and hazardous activities

Examples include schemes to promote use of lifting equipment, education campaigns about forklift safety and safer roadside working during highway maintenance. Specific schemes mostly target **a particular high-risk activity or a particular subsector**. For this type of scheme, the indicators of success were much clearer and, potentially, easier to measure.

There appears to be a trend for the more ‘specific’ schemes. Larger contractors tend to be the main actors or targets of schemes. But note that the aim of schemes involving certification or accreditation is to achieve a ‘level playing field’ across the sector (for example to ensure all contractors on a site meet the same safety standards) so SMEs are potentially key beneficiaries.

4.2 Profiling of the costs and benefits associated with the initiatives identified via the mapping exercise

As part of the mapping activities conducted, data were collected on the types of costs and benefits associated with the 107 OSH initiatives reviewed. These data have been analysed further and presented below.

Overview of the OSH initiatives

To provide a quick insight into the types of OSH initiatives identified, an analysis was undertaken to examine their correspondence with a series of general categories, as indicated below.

Table 4.1 Break down of mapping results by category of OSH initiatives

OSH Initiatives Categories	Number	Percent %
Training and guidance materials	26	24.3
Online tools/technologies/hardware/apps	12	11.2
Certificates/accreditation	11	10.3
Knowledge sharing, e.g. to establish standards / approaches	10	9.3
Bespoke guidance/consultancy	6	5.6
Insurance incentive	3	2.8
Improved commissioning practices	3	2.8
Campaigns with multiple outputs	13	12.1
Enforcement Initiative	3	2.8
Not falling in the above categories	20	18.7

As part of this sample, the largest category corresponded to the provision of training and guidance materials, initiatives with multiple types of outputs, and those providing online tools, although another significant category related to initiatives that could not be categorised.

Analysis of the Costs and Benefits of the OSH initiatives

Connected to each of the OSH initiatives, data were collected on the types of costs and benefits that would likely emerge if the initiatives were adopted by construction companies. It was not the intention to evaluate in-depth the performance of each of these initiatives, but to simply gather data on their possible effects via desk research and one or two interviews with organisations closely related or responsible for the initiatives.

Table 4.2 provides a summary overview of the types of costs and benefits that were identified for each of these broad categories of OSH initiative.

Table 4.2 Break down of mapping results by category of OSH initiative

Direct Benefits	Key findings of the mapping activities
Reduced accidents	Evidently, reducing accidents in the construction sector was an objective set by all initiatives. However, many initiatives did not feature quantitative targets or indicators linked to (reduced) accidents.

Direct Benefits	Key findings of the mapping activities
	Largely, this was due to the absence of a central body examining the ongoing performance of OSH initiative implementation. For example, this observation extends to several initiatives that provide online tools or guidance only. However, in a small number of cases, targets or indicators were used by OSH initiatives led by associations or construction companies that were responsible for their ongoing oversight and monitoring, for example: • "RT Zero accidents": The Finnish construction industry association (RT) has set a target of 30% reduced accidents per year. This initiative is voluntary and provides members with information sharing and training on OSH practices; • The "Agreement for Safety in Construction" is a Polish joint venture between 13 main contractors aiming to strengthen OSH standards; a target of zero accidents has been set; • "Clean Sheet" is a Swedish collaboration between several Swedish associations and construction companies aiming for a zero mortality rate on-site plus a significantly reduced accident rate.
Reduced insured costs	Although a reduced number of accidents limits the cost of company insurance premiums (assuming that rates are not increasing across the sector), many of the OSH initiatives did not mention this aim specifically. Therefore, generally, it can be said to be an implicit objective of the initiatives reviewed. However, considering the direct link between accidents and compensation payments to victims, a small number of OSH initiatives was provided by insurance organisations that had the general goal of helping their clients / the construction sector to reduce accidents, for example: • The Spanish insurance company, MC Mutual, via its OSH initiative, "Bonus Campaign", offered insurance premium discounts to construction companies that had demonstrated that they had met occupational health and safety requirements; • The Austrian General Accident Insurance Institute provided advisory support to companies to prevent falls from height at work; • A voluntary German initiative "'Guideline Planning and Execution of Construction Projects" involving government bodies and associations of statutory accident insurance provided OSH advice and training to scaffold and demolition companies.
Reduced non-insured costs	Despite being mentioned in the literature, the reduction in non-insured costs (such as identifying replacement staff or subcontractors after accidents occur and retraining) was not highlighted as a stated benefit of the OSH initiatives identified by the mapping exercise. However, clearly, these types of costs will be avoided if the number of on-site accidents is reduced.
Indirect Benefits	**Key findings of the mapping activities**
Improved Productivity	Improved productivity was mentioned generally as an explicit or implicit effect of the different types of OSH initiatives reviewed, including those that had the aim of reducing accidents through better guidance and training, but also in cases were Personal Protective Equipment or new machinery and tools were recommended to make building processes safer and more efficient, for example: • The Dutch initiative "raised bricklaying" developed new equipment and tools with the aim of reducing back pain experienced by brick layers; • The Slovak initiative "Promoting preventive behaviours for reduced musculoskeletal disorders (MSDs) among construction workers" provided guidance and direct advice to

Direct Benefits	Key findings of the mapping activities
	construction companies with the intention of limiting MSDs, and therefore enhancing levels of firm productivity; • The Danish "Safety and Health Preventive Service Bus for the Construction Sector" provided on a voluntary basis consultancy advice to companies on-site to help them meet their compliance duties through good practice advice.
Improving company well-being	While the reduction of accidents generally is implicitly associated with company well-being, some of the OSH initiatives had this specific goal in mind, for example: • Skanska Finland has introduced a company-wide programme, LIFE, that aims to raise occupational health and safety standards broadly through communication of good practices and sharing of experience, but it also has a focus on lifestyle and recreational activities with the intention of improving the health and well-being of its staff; • "Building in a healthy way" is a Slovenian initiative that seeks to promote the reduction of disorders among construction workers the aim of raising awareness, and providing education on possible preventive activities.
Reducing absenteeism	Another dimension of productivity that is typically associated with OSH initiatives is the objective of absenteeism. Again, this goal could be associated with many of the initiatives mapped, but this was focused on specifically by some, for example: • The Austrian initiative "Baufit", supported by the Austrian Institute for Social Security, had a focus on reducing MSDs through ergonomic advice, provision of load measurements and advice on compensatory exercises with a view to reducing (long term) absence from work; • The above-mentioned Slovenian initiative "Building in a healthy way" had the goal of reducing sick leave costs for companies. In this case, the initiative prepared a report for stakeholders on the causes of absenteeism in the construction sector and how improved OSH can reduce this trend; • Another Slovenian initiative "Safe work in the sun", targeted civil engineering site workers to protect themselves from UV radiation, and had the stated goals of reducing the amount of sick leave.
Reducing Presenteeism	The phenomenon of presenteeism (i.e. staff attending work while sick) was not mentioned specifically as an aspect to address by the OSH schemes. However, many of the initiatives aimed to reduce accidents and MSDs suggesting that reducing presenteeism is an implicit goal, even if not explicitly stated.
Improved Quality of Service	As mentioned in the literature review section, improvements in construction site safety have been linked to improvements in service quality and client perceptions thereof. Again, this could be implicitly suggested to be an indirect goal of all the OSH initiatives, although this was specifically mentioned as an objective in some cases, for example: • The Austrian initiative "All for one, one for all" implemented by Marchl Stahlbau GmbH, a steel construction works company, involved the use of new equipment that was suggested to improve the quality of services; • The Bulgarian initiative "Distance training courses and courses for construction companies on Healthy and Safety at Work", included several training modules, one of which specifically related to quality control of construction work; • A Czech organisation "Common Vision" was established with the joint aims of strengthening OSH standards and quality assurance practices in the construction sector, and shares information to its members on good practices and methods to meet legal requirements.
Reputational Benefits	The health and safety and construction management literature outlined the benefits between the avoidance of accidents and the reputational benefits that can be obtained with

Direct Benefits	Key findings of the mapping activities
	clients. In the cases of the OSH Initiatives reviewed, reputational benefits were at the back of the minds of some of the organisations responsible, for example: • Irish Construction Safety Advisory Committee (CSAC) noted had their scheme had resulted in their participating companies advertising their innovative safety practices to clients; • The Bulgarian Chamber of Commerce, which managed the scheme "Training under the Health and Safety at Work Act and for Safety and Health Coordination", mentioned one intention of their scheme was to improve the commercial reputation of companies.
Psychological benefits	In recent years, the mental health of construction workers has been subject to research, with the literature suggesting that the difficult on-site conditions are partly to blame for the problems identified. Although the reduction of accidents can be a causal effect in boosting psychological well-being generally, and is therefore a dimension associated with all the OSH initiatives, only a small number focused on addressing psychological issues specifically, for example: • In the UK, Laing O'Rourke, a construction company, has teamed up with the mental health charity, Mind, to offer a "mental health tool box talk" to its workers; • The Austrian initiative "Baufit" supported by the Austrian Institute for Social Security had a focus on providing psychological advice through its training modules; • The Italian "Work Stress Initiative" focused on providing risk assessment activities around work related stress via on-site expert training.
Direct costs	Key findings of the mapping activities
Costs of implementing the OSH initiatives	As explained, the direct costs relate to the costs of implementing the OSH initiatives, including any preparatory tasks, buying equipment, staff attendance costs, training services and guidance material etc. It must also be stressed, that these costs include the time spent by companies introducing the new practices learned, through behavioural changes, implementing new procedures, and learning new methods. As part of the mapping activity, data were collected on the costs involved for companies in participating in the OSH initiatives. As an in-depth evaluation was not conducted, information was not collected on the costs incurred by companies in attending the training sessions and adopting the new practices learned. To provide a quick insight into to some of the patterns associated with the: • The time involved for training courses or on-site visits typically lasted from one to five days, with in some cases some preparation work undertaken by the training providers; • The fees set by training providers were in the region of a few hundred to a couple of thousand Euros; • Given the work involved, certification services provided by accredited bodies were more expensive, with the fees differing according to the size of the company but typically were in the region of several thousand Euros; • Guidance materials and online tools were generally provided for free, if not already provided by the training, but of course time must be spent by the companies in reviewing the information; • Consulting services were sometimes provided for "free" to companies for example if they were a member of an association or an insurance institute; • Of course, company own initiatives were self-funded.

Direct Benefits	Key findings of the mapping activities
	As a general observation, the costs of training and materials did not seem to be prohibitively expensive. However, one must also factor in the number of employees participating in the initiatives and their salary costs. Equipment costs also need to be considered but these are subject to wide variation. As mentioned, companies also need to introduce the new practices and methods learned and this is likely subject to notable further costs.
Indirect costs	Key findings of the mapping activities
Opportunity costs	Opportunity costs were not mentioned extensively in the materials and interviews with the organisations managing the OSH initiatives. These costs relate to the loss of business revenue and opportunities due to company participation in the OSH initiatives (e.g. attendance at a training course also means that an employee is not performing fee earning activities). However, clearly there would be some opportunity costs incurred, although these would impact business to different extents.

Causal chain of the OSH initiatives

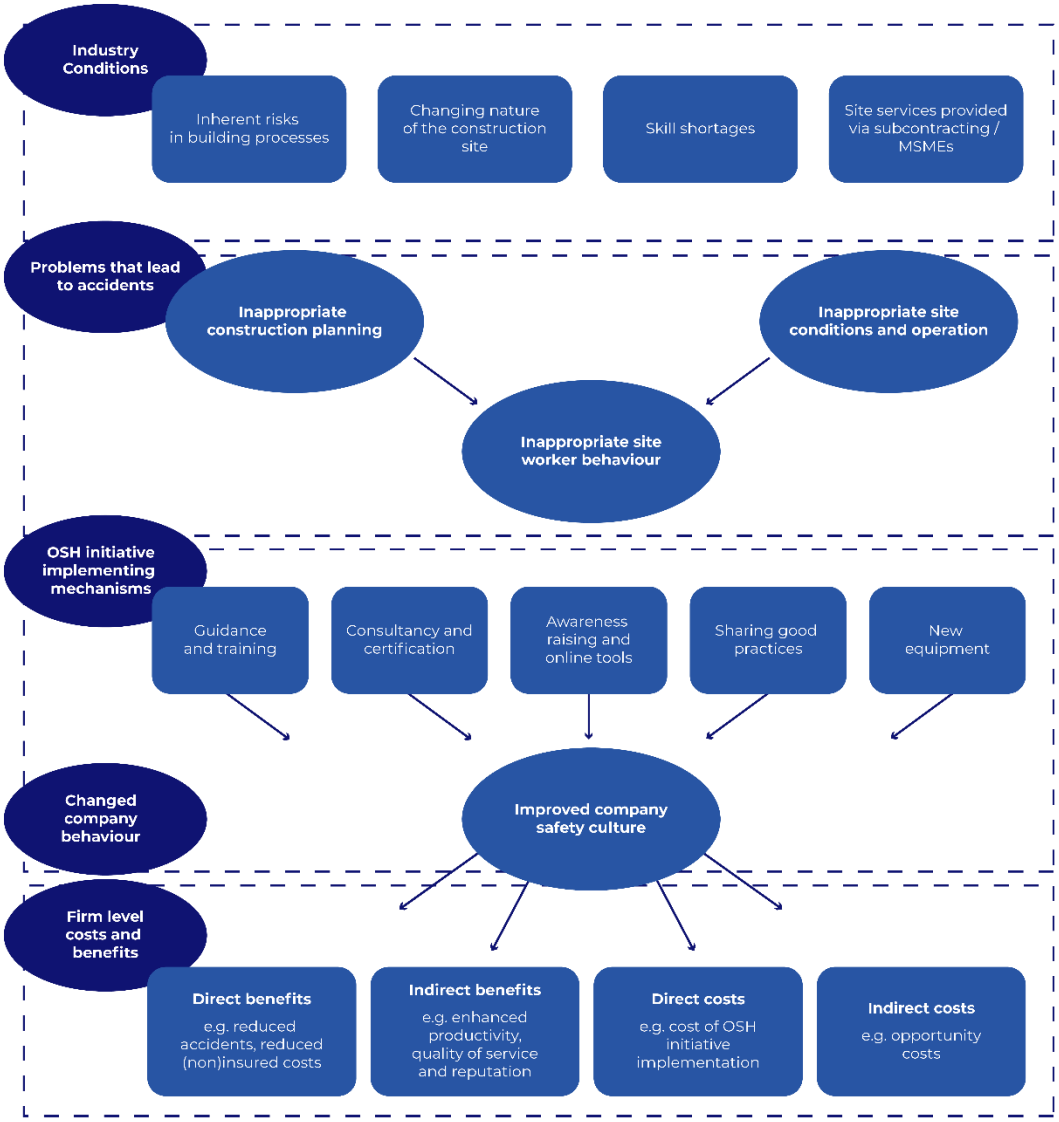
The final step of Task 2 was to identify the underlying causal chain of the OSH initiatives in addressing the main circumstances that lead to construction accidents, and the wider costs and benefits that emerge for companies in following the initiatives.

The approach was to analyse the casual chain data that were collected on each of the OSH initiatives that were subject to the Task 1 mapping exercise and to develop a generic causal chain that was a general representation of the OSH initiatives reviewed.

Causal chain of OSH initiatives

The final step of this Task was to review the causal chain of OSH initiative implementation, focussing on the wider industry conditions, the underlying problems that lead to accidents, the main OSH initiative implementation mechanisms, and the direct and indirect costs and benefits that are likely to emerge if improved standards are implemented by companies. This causal chain has been developed based on a review of the literature and Task 1 mapping results. This causal chain is indicated diagrammatically by Figure 4.1 and described in more detail below.

Figure 4.1 Causal chain of OSH initiatives



As indicated by Figure 4.1, to begin, it is useful to consider the wider OSH challenges that are inherent to the construction sector, which have been explained already in the beginning to this Chapter. These conditions must be dealt with by company planning, site operation and site worker activities to ensure that risks are identified and accidents minimised. This includes:

- the risks associated with building processes e.g. physical, mechanical, electrical, thermal, chemical, psychological etc;
- the changing nature of the construction that limits the introduction of safety measures that can "fix" risks permanently;
- the skills shortages in the labour market, such as task specific and OSH skills, and the need to use migrant workers who may not have the necessary knowledge of the national OSH requirements;
- and the need to provide services through subcontractors, typical micros, small and medium enterprises, that may be less risk averse than main contractors.

The following step in the casual change indicates the underlying problems that ultimately lead to accidents that are associated with the necessary steps that support the building process and are

subject to the conditions described above.[59],[60],[61] These problems can be subdivided into different stages of the construction process and between different types of functions across the firm, and include:

Inappropriate construction planning: accidents can often be linked backed to the initial planning stages of the project that often do not anticipate fully the conditions on the ground. For example, work schedules may change for different services, the actual conditions of the site may not be anticipated fully therefore appropriate upfront measures are not established (e.g. there may be limited space for vehicles entering and exiting the site when under development); task descriptions may be generic and not take into account the risk factors on the site fully; risks assessments may be superficial and inadequate given the complexity or issues relating to the site activities; challenges exist in appointing staff or contractors with the necessary task and OSH skills; and efforts may not be made to identify suppliers that use appropriate / safe packaging for materials.

Inappropriate construction site conditions and operation: the management of the site may also be subject to deficiencies that contribute to accidents. For example, adequate supervision of site workers and safety features may be lacking, for example, to check if scaffolding has been fixed appropriately; there may not be a sufficient understanding of the tasks performed by site workers and how they will perform their tasks; tool selection may be insufficient; there may be lack of appropriate personal protective equipment; coordination with sub-contractors can prove to be difficult if they are not well integrated into channels of communication; site specific safety concerns may not be communicated; the site set-up may be inappropriate for certain stages of the build unless adaptions are undertaken etc.

Inappropriate site worker behaviours: site workers themselves may not fulfil the responsibilities expected of them, for example, they may demonstrate poor safety behaviours in site areas that are associated with more risks e.g. confined spaces; poor use of personal protective equipment; poor use of tools; lack of awareness of vehicle entrances; not paying attention to dangers when walking around the site; subcontractors may not follow instructions in the absence of supervisors; poor communication between team members; not ensuring a clean workspace etc.

To address these problems, companies have been offered opportunities to engage in OSH initiatives provided by multiple types of stakeholders. These OSH initiatives have a focus on providing information on how best to meet safety standards broadly defined through a variety of activities such as guidance, training, consultancy services, certification, awareness raising, online tools, sharing good practices, recommending new equipment, providing insurance incentives etc. Yet, as explained in more detail below, it is difficult to determine how these activities are translated into results without in-depth assessment of the underlying processes of the individual OSH initiatives.

For example, it is useful to highlight that a common feature of these initiatives is to transfer OSH information to companies via short time windows and/or encourage the companies themselves to independently invest time in OSH familiarisation and implementation activities. This can be illustrated by indicating some of the causal chain descriptions of the OSH initiatives reviewed under Task 1:

[59] HSE (2003) Casual factors in construction accidents.

[60] V. Ardnt (2004) All-cause and cause specific mortality in construction workers. Occupational and Environmental Medicine, Vol. 61, No. 5 (May, 2004), pp. 419-425.

[61] Fredin, H (1984) Industrial accidents in the construction sector. Scandinavian Journal of Social Medicine. Vol 2, 66-77.

- The Danish “Bambus” schemes provides voluntary verbal advice to contractors on the job. In this case, after a one-day on-site risk assessment, the Bambus consultants explain how the specific site activities can be adapted to better meet the safety requirements. This provides efficient and tailored external advice to contractors on how they can independently improve their own on-site activities, which they must implement themselves typically without further guidance;
- The Irish “BeSmart” initiative provides online risk and safety assessment advice to contractors to help them identify hazards and implement controls to reduce the possibility of accidents. Therefore, contractors must independently identify, follow, interpret and implement the information to realise the benefits;
- However, the process is different in the case of certification schemes as indicated by the German “Construction Safety Certificate”. This is because companies must demonstrate to an accredited body that they have met the necessary requirements. Therefore, there is ongoing external scrutiny of company processes, and the certificates are only issued when satisfactory information has been provided demonstrating that standards (e.g. ISO 45001) have been met.

Moreover, a review of the Task 1 mapping results suggested that an explicit or implicit common goal is to introduce a “safety culture” in the companies that engage with the OSH initiatives so that the advice provided is adopted effectively. In a construction context, a safety culture has been defined as:

- The value of and belief in occupational safety are deeply and widely shared within the organization;
- Top management support and provide safety leadership by example;
- Training is provided to site workers to strengthen beliefs and attitudes;
- Employees are empowered to take their own actions to implement safety controls;
- Safety management, standards and systems are implemented across the company;
- The company safety processes are subject to ongoing performance assessment;
- A safety knowledge management system is designed and implemented;
- Rewards and recognition are provided for positive performance.[62]

Clearly, depending on the starting point of individual construction companies, a safety culture like the one described above may take significant investment and effort to develop, meaning that the advice provided will be adopted to varying extents by the companies participating in the OSH initiatives.

Thus, without further in-depth evaluation of the OSH initiatives, it is difficult to examine “how” participating companies have responded to the advice provided. In many respects, the development of a safety culture and the implementation of the advice provided via the OSH initiatives represents an evaluation “black box”. To learn of the outcomes of these processes, this would require significant scrutiny to examine the experiences of companies in participating in the OSH initiatives and how they have responded to them.

According to the literature already reviewed at the beginning of this chapter, participation in OSH initiatives and meeting safety requirements are likely to bring about a series of impacts in companies in the form of direct and indirect costs and benefits. It can be assumed that the ratio of benefits to costs is likely to be higher in companies that have well-established safety cultures,

[62] Zhou, P. (2011) Fostering a strong construction safety culture. Journal of Leadership Management Engingeering,11(1): 11-22.

meaning that the bottom-line results stemming from good OSH practices are likely to be more pronounced.

Conclusions

- The existing research and the Task 1 mapping results have revealed that a series of costs and benefits are realised for companies when following OSH initiatives and investing in activities to meet OSH requirements more generally;
- These impacts can be considered as part of a taxonomy of direct and indirect costs and benefits, as follows:
  - The direct benefits stem from the reduction of on-site accidents leading to reduced insured and non-insured costs;
  - The indirect benefits result in productivity gains, perceived and real improvements in service quality and reputational benefits;
  - The direct costs emerge from participating in the OSH initiatives but also in terms of companies adopting and implementing the information learned in the context of their individual safety cultures;
  - The indirect costs can be considered as “opportunity costs”, meaning that companies may lose earnings as a result of OSH initiative participation and implementation.
- The OSH initiatives reviewed as part of the Task 1 mapping activities fall into multiple categories including guidance and training, online tools, certification procedures, consultancy, sharing of best practices, insurance incentives etc.;
- It can be assumed that all OSH initiatives reviewed by Task 1 could be associated with all the costs and benefits identified as part of the literature review. However, the intensity of the costs and benefits will likely vary per initiative considering:
  - their relative levels of effectiveness in shaping company behaviour considering their individual causal chains (e.g. some initiatives provide online advice only whereas other provide tailored advisory services on-site);
  - their individual fees, amount of information they transfer, the number of company participants, and the degree to which companies invest time in adopting the newly learned practices;
  - the individual focus of the initiatives themselves, e.g. to address site specific issues, OSH compliance issues generally, psychological wellbeing of site workers specifically etc..
- OSH initiatives have been introduced to respond to a complex safety management context, where the sectoral conditions heighten the safety risks. This includes the changing nature of the construction site, the inherent risks involved in conducting building processes, the need to engage micro, small and medium sized firms that may be less risk averse etc.;
- Accidents have been noted to occur when construction company functions and process do not adequately respond to this context, for example, there may be inadequacies in construction planning procedures, site operation and management processes, and in the behaviour of site workers;
- The extent to which OSH initiatives can address these shortcomings largely depends on the companies themselves to adopt and implement the learning lessons provided;
- Companies with established safety cultures are likely to obtain better results in implementing OSH good practices and higher benefits to costs ratio. Therefore, there is a clear business case to nudge construction firms towards further investment in OSH activities.

5 Framework for the financial analysis and assessment

In this chapter we present the framework for financial analysis and assessment. The aim of the framework is to develop a viable tool to assess the profitability of risk prevention measures, taking into account differences between countries and companies that affect the effectiveness and profitability of those measures. It provides a unified approach that is differentiated by the relevant factors and is viable with regard to the data requirements.

5.1 Financial framework

The financial framework is a tool to calculate costs and benefits of investments in accident prevention from the perspective of companies. Benefits for workers and society are also important. However, the main goal of this study is to show the specific benefits for companies. For this reason, benefits for workers and society are out of scope for this study.

The tool uses broad EU statistics on accidents and costs of measures, more granular statistics from a limited number of countries, and 20 case studies across the EU. Nevertheless, the tool does not cover all EU countries, all sectors and occupations, all detailed risks, all types of investments, all work methods and environments or all different ways construction work can be organised. In the end, the framework will remain a high-level tool to appreciate the financial benefits of investments in OSH, in addition reminding companies that investments in work safety are a legal requirement.

The tool helps construction enterprises compare costs and benefits per worker of investments in OSH, and optionally at the company level. The costs and benefits at the company level are simply the values per worker multiplied by the number of craft workers in the company. Thus, the framework ignores OSH investments for office workers in construction and focuses entirely on those working “on the site”.

For companies, in addition to compliance with legal requirements, investments in work safety reduce the number of accidents and the company avoids the associated costs. Investments in work safety also reduce occupational diseases such as musculoskeletal disorders (MSDs), skin diseases, asthma and stress, as well as longer latency diseases such as cancer, for example caused by asbestos. However, costs-benefit calculations for even occupational diseases with a short-term latency would suffer from two major lacks of data:

- Lack of sound data on how OSH prevention affects occupational diseases;
- Lack of sound data on how occupational diseases affect productivity.

The latter is actually also true for accidents; however, accidents involve many other quantifiable costs. Despite these limitations, we decided to include four occupational diseases: skin diseases, MSDs, hearing problems and work stress.

One might expect that higher investments result in further reduced accident rates, however no data are available to model how accident rates depend on the level of investments and we refrain from making assumptions on this. The fact that the framework does not differentiate between investment levels also implies that the model only compares total costs and benefits of (reasonable) measures. The model does not even allow choosing in which measures to invest: there is no OSH a la carte.

The model does however allow choosing in which measure the company has already invested. The more a company has already invested (the fuller is the “cup”), the smaller the additional benefits of further investments are (the less is left to fill).

Using the taxonomy of costs and benefits of Task 2, the researchers collected data on costs of OSH investments and costs of accidents through desk research. The tool compares costs of investments with the avoided costs of accidents in all relevant future years – until a certain time horizon that the user can choose. The default is a required payback period of ten years. Therefore, the tool adds up the avoided costs of accident of all years until the time horizon. However, we do so after discounting future benefits to reflect opportunity costs. An investment in OSH may imply a foregone investment in productivity or winning work. For this reason, the model discounts future benefits (and future costs of for example maintenance) at a certain required rate of return that the user can choose, for example 4 per cent per year. The longer the time horizon and the lower the discount rate, the higher the value of the benefits. The framework limits the time horizon to 40 years, which roughly represents the length of a work life, and allows a minimum discount rate of 0%. This setting would multiply avoided costs per year by 40. However, giving the user control of the time horizon and the discount rate should increase his confidence in the outcome.

In order to help understand how measures and risks contribute to the costs and benefits, the output compares costs and benefits per type of measure and per category of risk. To this end, the tool allocates some investments that are not risk specific to risk categories commensurate with the accident rates.

The tool requires some inputs from the user such as company characteristics. We decided to develop two input sheets: one with minimal user input and one with “advanced user” input. Items can be cut-pasted from one sheet to another without affecting any calculation. We further describe the output of the financial framework, the calculation of accident rates, of costs of investments and of their benefits.

5.2 Minimal user input for the framework

Following advice from a stakeholder meeting on the framework (see Chapter 7), the tool keeps user input for the framework to a minimum:

1. Company characteristics;
2. Optional choices affecting the benefits of accident prevention.

The limited user input implies that companies can only compare costs and benefits between situations with no measures at all and full investments, rather than costs and benefits of only those measures in which the company has not yet invested. However, the output presents costs and benefits per measure, so the company can still make the assessment that is relevant to them.

1. Company characteristics

The user can specify the (home) country, the subsector and the number of craft workers in the firm. In addition, the user can specify whether he wants to see the output per work or at the company level, and in which currency he wants to see the output.

The home country mainly affects the cost levels of OSH investments and accidents and must be one of the EU28 countries of 2019, through reflecting differences in purchasing power. Mainly, costs of labour and of services are quite lower in the south and east of Europe than in the north and west of Europe, while the difference in costs of machines and equipment is smaller.

The subsector mainly affects the accident rates, but also affects the costs of accidents through the wage rate applied to lost work. The framework distinguishes between:

- Building construction;
- Specialized construction;
- Civil engineering.

Building construction consists of both residential and office building and corresponds to NACE code 412. Specialized construction consists of installation services, site preparation, building finishers and corresponds to code 42. Civil engineering consists mostly of infrastructure construction and corresponds to code 43. The framework does not cover Project development (code 411).

The number of craft workers affects some costs of investments and of accidents. For example, the higher the number of craft workers, the lower the cost per worker of managing OSH investments. Some costs of accidents increase with the number of craft workers, for example in countries where the fine increases with company size, or because a temporary shutdown by authorities affects more workers. On the other hand, a greater number of craft workers also increase the possibility to catch up lost time to avoid a project delay.

The framework calculates costs and benefits per worker, and the user may choose to see this output. However, the user may also choose to see the output at the company level. In the latter case, the tool shows costs and benefits per worker multiplied by the number of craft workers.

For the currency, the user can choose between three options:

- National currency;
- EUR;
- EU average (€).

The national currency that is used depends on the choice of the country and the currency option. For the euro countries, the output will be in euros for both the national currency and EUR options. However, if for example the country Poland is chosen, a choice for outputs in the national currency will result in costs and benefits presented in zloty. In both the national currency option and the EUR option, construction sector wages, medical costs (applicable after accidents) and costs of safety equipment in the country of choice are estimated. For example, in Germany higher wage rates apply than in Portugal. The third option of output in EU averages uses the EU average wage of craft workers in the construction sector, the EU average of medical costs, costs of equipment etcetera, and may be useful for multinational companies.

2. Optional choices affecting the benefits of OSH investments

In most countries, the law requires the company to pay a certain percentage of the wage to the worker after a certain waiting period (during which the worker receives no sick pay) up to a certain maximum period, after which the social security fund takes over the sick pay. The waiting period varies between 0 and 3 days. If the company needs to pay for sick leave, this is for a period varying between a few days up to 2 years according to the MISSOC database.[63] In some countries, the percentage of the wage that the employer needs to pay depends on the duration of the sick leave,

[63] https://www.missoc.org/missoc-database/comparative-tables/. In exceptional circumstances, the company needs to pay up to 3 years of sick pay in France, but we disregard this because it is exceptional.

meaning that during a first period the employer needs to pay a higher or a lower percentage of the wage than during a second period, depending on the country.

An employer may choose to insure the sick pay, and may insure the medical costs after an accident as well. The insurance of sick pay is voluntary; law in any country does not require it. Insurance of medical costs is compulsory for employers in some countries, such as Slovakia. Insurance cushions the financial effect of an accident for the construction company because the insurance company bears part of the costs.

Insurance companies always require that the insured company bear part of the risk: the first few sick days or the first costs up to a certain amount the insured company still has to pay itself. This is necessary to avoid the so-called moral hazard problem: a company asking a worker to call sick because there is no work for him the next day if the insurance company pays all sick days anyway, or a worker calling sick because he knows his employer need to bear the wage costs.

Companies may typically choose their “own risk”, and this option should pop up after the company has checked that it is insured. The higher the own risk, the lower the insurance premium is, and the formula for this is deduced from onsite offers. A lower accident rate or proof of compliance with (legal) safety requirements may further lower the insurance premium, and the tool assumes this lowers the insurance premium by 10 per cent based on one online offer (based on Dutch and Spanish cases found on Internet). Annex 1 provides the underlying formulas.

The tool assumes that companies do not pay a higher percentage of the wage than required according to national law or the collective agreement, and thus a voluntary higher sick pay than required is not among the options in the user input.

Lastly, a company has two options if work time is lost due to accidents to meet the project deadline: overtime work or paying a penalty for late delivery. The overtime option is cheaper even with a 25% overtime wage rate, but workers must be willing to work overtime and an accident may actually motivate them less. The tool assumes 0.25% of the project value per day beyond the deadline as a penalty for a late delivery, based on various examples found on Internet. For this reason, the tool asks the user to provide a typical project value.

5.3 Advanced user input

Additional user input makes the tool more flexible but also heavier on the user. Input that a more experienced user might want to view and/or change includes:

- Investments already done;
- Investment in safety equipment;
- Indirect benefits;
- Financial requirements.

Lastly, the tool gives the user the option how to use the very low accident rates in some countries as discussed in the Chapter 5.5.

1. Investments already done

One approach to see the impact of investments already done is to compare the situations of zero and full investments and present costs and benefits per type of investments. The user could then add up costs and benefits of investments that the company has already done to appreciate what it

already has achieved, and could add up costs of benefits of investments still to do to appreciate further costs and benefits.

Another approach is to let the company fill in which investments it has done and needs to do and present the costs and benefits separately for those already done and those still to do. This requires more user input upfront but reduces the need for own calculations afterwards.

This brings us to a fundamental issue: suppose that two measures “A” and “B” cost 100 and both reduce the number of accidents by half. Suppose for example that the accident rate is 20% without measures and either measure would reduce the accident rate to 10%. The two measures combined would reduce the accident rate to 5%, i.e. by 15 percent points (we actually use a different assumption discussed later). For a hypothetical company that already invested in measure “A” but not in “B”, the reduction by “A” was 10% point and the additional reduction by “B” would be only 5% point. In short, the benefits of remaining investments are likely smaller even for equally effective measures. This is even more the case if the company has invested in quick wins first. An implication is that costs may exceed benefits more often for remaining investments than for the zero-full investment comparison.

Table 5.1 Accident reduction (in % point) by investing in one of the measures A or B separately and in a combination of the measures of A and B (see text)

Measure	Cost	Accident reduction
A	100	10%
B	100	10%
A+B	200	15%

The user can select investments already done in a separate “advanced user” input sheet. However, the block for selecting these investments can be cut-pasted to the main user input sheet without affecting any calculations. In order to ease user input while increasing the likelihood of positive outcomes, default values are “investment not yet done”.

The input sheet allows the user to select for seven types of OSH investments whether the company already made them or not. For most types of investment, the choices are binary (yes or no). For training, the tool offers a choice between four mutually exclusive choices:

- Training in safety competences (1 day every year);
- Training in culture (motivation, alertness, priorities – 1 day every 5 years);
- One-off awareness / basic safety training (1 day);
- No training yet.

If the user chooses the first alternative, the tool does no calculations for further training. If the user chooses one of the other alternatives, the tool calculates the cost and benefits of upgrading to the first alternative.

Another special advanced user input concerns the FTE (full-time equivalent) of the OSH officers currently working at the office. If the number of craft workers is 15, the determined target of 1% of the number is 0.15. So if you fill in 0.1 in the “Advanced user input” sheet (or 0,1 if the decimal separator in Excel is set to be a comma instead of a point), the current FTE of OSH officers is 0.05 FTE short of the determined target, and the tool calculates the costs and benefits of investing 0.05 FTE to meet the determined target.

It should also be noted that wage costs increase linearly with FTE of OSH officers, but training costs increase per person instead of per FTE. So if a company has 50 workers, and currently

employs 0.1 FTE OSH officers, the company is 0.4 FTE short of the determined target. The foreman (or whoever does OSH checks) then needs to spend more time on OSH and the company needs to hire 0.4 FTE to do the work that the foreman previously could do. Thus wage costs increase by 0.4 FTE, but the foreman already has OSH officer training, so no further OSH officer training costs are incurred. Only if, for example, the company employs more than 100 craft workers, and currently employs less than 1 FTE of OSH officers, another OSH officer needs to be trained.

It is technically possible to select any combination of 10 OSH investments and 18 risk categories in the sheet “Measures and Effects”. However, most measures likely affect all types of risks and the tool assumes this to simplify the user input in the (system) user input sheet.

2. Investment in safety equipment

The tenth OSH investment in the Input sheet is specific for each risk: investment in safety equipment. There are often many technical solutions for a specific risk, for example clams and lattices for ladders, a pulley system to hoist workers in a basket, to proper scaffolding. For each type of risk, the tool assumes one type of investment that seems appropriate for the risk, based on logic and feedback from case studies.

One may expect that more expensive safety equipment further reduce the accident rate. However, we lack the data to model the accident rate as a function of safety equipment, having only data comparing accident rates between companies with and without safety equipment.

3. Indirect benefits of OSH investments

The literature mentions at least four indirect benefits of OSH investments. The company does not reap these benefits per avoided accident, but rather through other effects that a safer work environment may have on workers, for example:

- Change in efficiency (for example: fewer near miss incidents[64]);
- Lower absenteeism for personal safety concerns;
- Reduced hiring costs due to less staff turnover;
- More projects with less idle time due to quality work.

The change in efficiency comes from the fact that even near misses can reduce efficiency by slowing down work. However, if for example a procedure provides that work should not start before a safety coordinator approves the security of the workplace and he is late, OSH investments could also reduce efficiency.

Absenteeism for personal safety concerns refers to workers who call sick because they consider the work place or a certain project as unsafe. This may be even before any accident has happened, or may apply to colleagues of victims after an accident.

If many accidents happen or staff considers work unsafe, they may leave the company for that reason and then companies need to replace them. In addition, having a bad safety reputation may increase the difficulty of finding replacements.

The literature also argues that more care for safety increases the quality of the work, and some clients value a construction without accidents in itself.

[64] A near miss incident is an unplanned event that did not result in injury, illness, or damage – but had the potential to do so.

However, except for the change in efficiency, the literature rarely quantifies these effects. Some of the measures documented in literature such as a stool for bricklayers are arguably investments in efficiency with increased safety as a bonus. More in general, it is doubtful how representative non-accident related benefits documented in the literature are, to the extent that researchers do not document the absence of benefits.

Therefore, we give the user control over the assumed indirect benefits, but not in the basic input sheet. The default effect increases with the reduction in the accident rate. The reason is that companies that already have invested a lot in accident reduction reap smaller direct benefits in terms of further accident reduction and further indirect benefits should be small as well. In case studies across the EU, construction companies reported estimates of these indirect benefits. The tool estimates the indirect benefits by multiplying the accident rate that would result in the average reported indirect benefits after a full reduction of the accident rates (compared to no investments).

The default formulas for the indirect benefits are chosen in such a way that estimated reductions in accident rates (excluding rates of new occupational diseases) result in the range of indirect benefits reported in the case studies, and linearly increase with the reduction in accident rate. For example, a majority of companies report that investing in safety measures increases efficiency, for example due to clearer procedures or fewer near-miss incidents, and it makes sense that more investments (further reducing the accident rate) also further increase efficiency. It also makes sense that workers are also more likely to stay longer the more the firm invests in safety measures. This reduces hiring costs. The quality of work is also likely to increase with investment in safety measures because materials may get damaged in accidents or workflows get interrupted. Quality of work increases the company's reputation and the chances of winning projects, resulting in less idle time between projects. Lastly, if workers feel unsafe without investments in OSH, they might be more often absent from work even if no accident happens. More investments in safety not only reduce the accident rate, but also increases the perception of safety. This indirect benefit is reported to be smaller than others, but is not negligible. In sum all indirect benefits are likely to increase with investments in safety measures, an effect that is captured with the reduction of the accident rate:

- Efficiency: Δ accident rate * 2/3
- Reduced hiring costs due to less staff turnover; Δ accident rate * 2/3
- More projects with less idle time due to quality work: Δ accident rate * 1/3
- Lower absenteeism due to personal safety concerns: Δ accident rate * 1/6

The (advanced) user can overwrite these formulas by entering their own estimates, however the values they can enter are restricted by a data validation. For the change in efficiency, the advanced user input is restricted to -10% to +20%. The assumption is that each craft worker completes any work in x% less time if the change in efficiency is positive, and that work takes x% more time to complete if the change in efficiency is negative. The range is quite wide, but is in line with reported effects.

For a lower absenteeism, the effect is the same as for a change in efficiency of the same magnitude, but this effect is restricted to 0% to +5%.

For reduced hiring costs, the tool multiplies the difference in staff turnover with the estimated hiring costs of all craft workers in the company.

The tool assumes the effect of increased number of projects is the same as for a change in efficiency, assuming that workers would otherwise be idle between projects: the tool assumes that the increased number of assignments does not result in a need to recruit and pay more workers.

4. Financial requirements

Companies (and workers!) reap benefits of OSH investments for several years after the initial investment. Some companies (or their banks) require earning back investments in a shorter time than others, and some companies could have invested the money spent on OSH measures in more profitable alternatives than others (indirect costs).

The tool gives the user control over the required payback period and rate of return to cater for these differences between companies. These two values are used to calculate the so-called present value of future benefits (and repeated costs such as maintenance) of OSH investments. This present value is the sum of all future benefits, discounted at the required rate of return. The tool assumes that all recurrent benefits (and costs) are constant over time. Under that assumption, the formula for the present value of a constant recurrent benefit (or cost) with discount rate r and time horizon T is:

$$Present\ value = \sum_{t=0}^{T} \frac{c}{(1+r)^t} = c \cdot \sum_{t=0}^{T} \frac{1}{(1+r)^t}$$

The tool applies the same time horizon and required rate of return to all types of investments in accident prevention, and thus multiplies all recurrent costs with the same present value multiplier. Because not all companies may be familiar with the concept of a present value, the tool converts present values into annual equivalents ("annuities") a described in the next chapter.

The default values are r = 4% and T = 10 years. The discount rate of 4% is lower than customary for commercial projects, however OSH investments are compulsory so in reality the company could not have invested the money in other projects anyway.

5.4 Output

The output shows both the accident rate before OSH investments and after OSH investments, as well as the costs and benefits of OSH investments and their difference.

The accident rate before OSH investments and the costs are in cells shaded in orange, while the accident rate after OSH investments are in cells shaded in blue.

The difference between the above is marked green if "good": a reduction of the accident rate and a positive difference between benefits and costs.

The output compares costs and benefits per risk and per OSH measure, with allocations of benefits to measures and the costs of most OSH investments to risks. The tool presents costs and benefits as annual values ("annuities"). The tool uses the Excel formula for annual values, which one can also find by rewriting the formula for the present value as:

$$Annuity = Present\ Value\ /\ \sum_{t=0}^{T} \frac{1}{(1+r)^t}$$

In addition, the output shows costs per type of cost, aggregated over all measures. For example, the cost of purchases of material / equipment includes the purchase of safety equipment and of training. The tool also shows for example the annual cost of maintenance material and the cost of time lost while workers participate in training. The output does not show costs per type for each measure to keep the overview simple.

Lastly, the output shows the benefits per type of benefit (for example avoidance of sick pay, costs on the day of the accident, etcetera).

All cost breakdowns add up to the same total costs, and likewise all benefit breakdowns add up to the same total benefits.

Note that the current financial framework tool also presents details of disadvantageous cost-benefits ratios. The tool does not explicitly show negative results for OSH measures. Instead, the tool suppresses all differences between benefits and costs if the total difference is negative and replaces this with the message:

"Sorry, a negative value. However, OSH has many benefits and is legally required."

A message where to find further information is useful for all users and thus put standard at the bottom of the output tables:

"For further information see: https://osha.europa.eu/en/about-eu-osha/national-focal-points/focal-points-index*."*

5.5 Accident rates

Introduction

The main goal of accident prevention is to reduce the number of work related accidents. The tool compares the accident rates in two counterfactual situations:

- No investments in accident prevention at all;
- Full investments in accident prevention.

Most construction companies will likely have made some investment in accident prevention, and thus actual accident rates are less than in the first counterfactual situation of no investments at all. Based on a Dutch study (no longer available online)[65] the rate of accidents reported by workers is up to twice as low in companies that have taken certain measures compared to companies that have not taken those measures. These proportions by which various measures reduce the number of accidents are checked with construction companies in the case studies. The final estimates are the averages of the proportions reported by construction companies, in the sheet [Case study effects of measures].

One needs to keep in mind that statistics on accident rates apply to companies of which most have made some investments in accident reduction. Detailed statistics on accident rates are available in the European Statistics on Accidents at Work (ESAW).[66] These statistics are the basis to estimate the counterfactual accident rates without any investment in accident prevention in five steps.

Actual accident rates

According to the ESAW metadata, the statistics "*are based on case-by-case data for accidents at work resulting in more than 3 days' absence from work, permanent incapacity or death of the victim.*

[65] http://www.arbouw.nl/producten/onderzoeksrapporten/monitor-arbeidsongevallen-in-de-bouw-2016.

[66] https://ec.europa.eu/eurostat/data/database select "Population and social conditions" and then "Health".

An accident at work is 'a discrete occurrence in the course of work which leads to physical or mental harm'." This means that accidents with 0-3 days of absence from work are not included in these statistics. However, of course those accidents also involve costs. The source for ESAW is for most countries the national statistical office or the national social security institute. We checked if statistics on accidents with 0-3 days of absence might be included at those sources. We only found this for the Netherlands (accidents in construction with 0-3 days are half of the total) and Finland (accidents with 0-3 days are one third of the total across all sectors).

One result from the ESAW statistics on the rates of accidents at work in construction that jumps to the eye is the huge variation between countries, from 0.1% in Bulgaria and Romania to over 6-7% in France, Spain and Portugal. This raises the question about how to deal with this. One could assume that such differences are inherent to differences in construction work, that companies in some countries have invest more in accident prevention than in other countries, or that they are caused by differences in how fast workers return to work or even differences in reporting. In addition, ESAW statistics are in most countries ultimately statistics from national social security offices, based on reported accidents for employees. If a company hires self-employed staff or pays undeclared wages, they do not register workers as employees, nor do they register their accidents with the social security office.

Curiously, the total accident rates in Bulgarian and Romanian construction are more than 20 times as low as the EU average (2.9% in 2016), but the rate of fatal accidents in those two countries are twice as high as the EU average. Another curious finding based on national statistics is that for Slovakia the total number of accidents in construction resulting in 4 or more days of absence from work (including accidents outside work) is higher than in the Netherlands, but the rate of accidents at work is lower than in the Netherlands. A third curious finding is that in German building construction, the rate of accidents at work was between 3.0% and 4.2% in 2008-2011 and suddenly fell to between 0.1% and 0.2% in 2012-2017. All of this suggests that differences in reporting accidents may account for a part of the variation between countries.

Comparing ESAW with Labour Force Survey (LFS) statistics confirms that differences in reporting may account for part of the variation in accident rates.[67] In a special module of 2013, 4.8% of the workers reported to have had an accident in the last twelve months, to 2.9% in ESAW for that year. Because the LFS data include accidents at work with 0-3 sick days, it makes sense that the LFS accident rates are higher. Thus, LFS accident rates seem more accurate, and ESAW data are mainly useful to estimate breakdowns by subsector and type of risk (and company size).

In the LFS, the lowest reported accident rates are 1.1% for Hungary and 1.2% for Poland, and the highest is 11.4% in Finland. However, in Poland 86.2% of the accidents result in sick leave and in Finland only 45.5% (data on this are absent for Hungary). These stark differences point to differences in perception, for example about what counts as an accident or a near-accident. Because workers in construction include office personnel, we also analysed accident rates reported by craft workers (across all industries) and found similar results as for the construction sector.

Due to the above findings, we conclude that accident rates at work in construction of 0.1% (with 4 or more days of absence from work) as in Romanian ESAW statistics are not accurate, also

[67] Ad hoc module of the Labour Force Survey (LFS): see https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Self-reported_accidents_at_work_-_key_statistics

because construction workers in that country reported an accident rate at work of 2.5% (with 0 or more days of absence from work).

Counterfactual accident rates without investments

The methodology for the tool estimates counterfactual accident rates without accident prevention in five steps:

1. Actual accident rates with 4 or more sick days in subsectors;
2. Actual accident rates including 0-3 sick days in sector as a whole;
3. Conversion of accident rates in subsectors to include accidents with 0-3 sick days;
4. Estimate of counterfactual accident rates without investments;
5. Further detailing by type of risk.

Step 1: rates of accidents with 4 or more sick days in subsectors using ESAW data

ESAW statistics do not reveal clear patterns in accident rates between company sizes or subsectors. At the EU average, the rates of accidents at work were 2.1%, 3.8%, 3.4% and 4.2% for companies with respectively 0-9, 10-49, 50-249 and 250+ employees. For subsectors, there is no clear pattern either but one could imagine that for example road construction is more dangerous in Germany because of higher speed limits on highways. Because accident rates can be atypically high or low in any given year, the tool predicts the accident rate for 2018 by extrapolating the linear trend from 2008-2017 per subsector.

Step 2: estimated accident rates including 0-3 sick days using LFS data

Based on LFS statistics, the tool groups countries in three categories with assumed rates of accidents at work of respectively 3, 7 and 5%:

- Less than 3% in both 2007 and 2013: BG, HR, HU, IE, LT, LV, PL;
- More than 7% in both 2007 and 2013: AT, DK, FI, FR, LU, SE;
- Other countries: BE, CY, CZ, DE, EE, ES, GR, IT, MT, NL, PT, RO, SI, SK, UK.

Step 3: conversion of ESAW accident rates to rates including 0-3 sick days

From step 2, we have ESAW data of accidents at work resulting in four or more sick days in subsectors, and from step 1 we have LFS data of accidents at work including 0-3 sick days in the construction sector as a whole. Because there is no clear pattern in accident rates between subsectors, the tool assumes no difference between subsectors in how fast workers return to work. We therefore applied for each country the ratio of accident rates in subsectors to the whole construction sector according to ESAW data to the figures of 3, 5 and 7% estimated in step 1. This results in the following estimates:

- Construction of buildings: from 1.7% (Poland) to 9.0% (Netherlands);
- Civil engineering: from 2.0% (Cyprus) to 14.1% (Malta);
- Specialised construction: from 1.8% (Ireland) to 8.0% (France).

Step 4 estimation of counterfactual accident rates without investments in accident prevention

From step 3, we have estimated the actual accident rates. However, the actual accident rates depend on investments in accident prevention, and some companies may have invested more than others may. Because the tool calculates the benefits (and costs) of investments compared to the situation of no investment at all, we need to estimate the counterfactual accident rates.

The Dutch study cited at the start of this chapter showed that accident rates in companies in the construction of buildings or specialised construction that have made a certain investment to prevent accidents can be up to twice as low as in companies that did not make that investment. The Dutch accident rate in the construction of buildings is among the highest in the EU, and hence it makes

sense to assume that in countries with the highest accident rates, the counterfactual accident rate would have been even twice as high without investments.

The big question is whether in countries with lower accident rates the counterfactual accident rate would also have been twice as high or that counterfactual accident rates would have been more than twice as high (because companies in those countries have on average invested more in accident prevention). If we multiply all accident rates by two, we implicitly assume that construction work in some countries is inherently safer than in other countries, or that underreporting accident rates results in lower costs for the company.

The reality is likely in between the above two situations. We therefore calculated accident rates under two sets of assumptions:

- Counterfactual accident rates without any investment are always twice as high as observed;
- Counterfactual accident rates are twice as high as observed in the top third countries of observed accident rates, three times as high as observed in the middle third and four times as high as observed in the bottom third.

Under the second set of assumptions, the counterfactual accident rates vary as follows:

- Construction of buildings: from 7.0% (Poland) to 18.1% (Netherlands);
- Civil engineering: from 7.9% (Cyprus) to 28.1% (Malta);
- Specialised construction: from 7.0% (Ireland) to 15.9% (France).

Thus, the ranking of countries remains roughly the same under the second set of assumptions, but the differences between countries become relatively smaller.

If one believes that accident rates are accurate in all countries, the first set of assumptions gives the best estimate. If one believes that accident rates do not differ as much between countries as statistics suggest, the second set of assumptions gives a better estimate. The tool gives the user the option to use the second set of assumptions, or to calculate the average of the accident rates under the two sets of assumptions.

Step 5 further detailing by type of risk

The costs of accidents vary between risks. For example, falling from a roof generally causes far more serious injury than hitting your thumb. An adequate calculation of benefits of avoiding accidents therefore requires accident rates by type of risk. Such data are available from the ESAW Phase 3 statistics of 2005, although only at the EU level and only for construction as a whole. We analysed accident statistics both by mode of contact and by deviation from a safe situation. However, although we used statistics of the construction sector, the classifications of modes and deviations are not specific to the construction sector. In particular, the ESAW statistics do no distinguish between falling from a low or a high height.

We therefore used a more detailed and more recent (Dutch) study to estimate accident rates for more specific risk categories for the construction sector. The percentage breakdown by risk in this Dutch is very similar to the ESAW breakdown, even though the ESAW study is based only on accidents with 4 or more sick days and the Dutch study on reported accidents regardless of sick days. We adjusted the Dutch statistics to the breakdown at the EU level.

In the construction sector, workers may commute to the head office and then travel jointly in a bus to the construction site. Some consider accidents occurring in the latter travel as work related. However, the ESAW statistics do not seem to include this category. One case study mentioned that such accidents occur frequently on bad roads and more often cause damage to the bus than

personal injury. However, although this is a relevant risk category, we found insufficient data on this to incorporate this in the tool.

In addition, workers may contract occupational diseases without an accident. Statistics on occupational diseases reported by workers are available, but not specifically for the construction sector and not specifically for newly contracted diseases. The latter is important because a construction worker can for example move to the retail sector after having developed a pain in the back. Hence, a warehouse worker reporting a "musculoskeletal disorder" may have developed it in the construction sector. Instead, we used one-off studies to estimate the rate at which construction workers contract occupational diseases, the occupational disease rate for short. Any calculations for occupational diseases use on very limited data, and should be considered as best guesses.

Measures and risks

In the sheet "Measures and Effects", the big table of measures and risks maps the user input from the sheet "Input" into one table. The multipliers below this table indicate by how much a measure reduces the risk. For example, if the multiplier is 0.95 then the risk is reduced by 5% and if the multiplier is 0.45 then the risk is reduced by 55%.

If a company invests in more than one measure, it makes sense that the accident rate is reduced further. However, we did not find any literature about how combinations of measures reduce accident rates. Therefore, we developed a formula with the following characteristics:

- If only one measure is selected, the multiplier is the multiplier of that one measure;
- If more than one measure is selected, their combined effect reduces accident rates more than the most effective of the two;
- The more measures are selected, the lower is the accident rate;
- If a few measures are selected, this results roughly in observed accident rates (assuming that most companies invest in at least a few measures);
- If all measures are selected, the accident rate does not vanish to zero.

We achieved the above criteria by using the following formula:

$$m = \sqrt[3]{m_1^2 \cdot \prod_{i=1}^{N} m_i}$$

Where m is the multiplier of all combined measures and m_1 … m_N are the multipliers of the individual selected measures in increasing order. In words, this formula takes the square root of all multipliers multiplied with each other, and once again with the first multiplier. Here, the first multiplier is the multiplier of the selected measure that reduces the accident rate the most. The above formula implies that if only one measure is selected, then $m = m_1$. For any subsequent measures, only reduce the accident rate further by the square root of their individual multiplier.

For easier calculations in Excel, the tool takes the exponential transformation of the logarithmic transformation of the above formula. Since x = exp(ln(x)), the outcome remains the same. However, using that exp(a) · exp(b) = exp(a+b), this allows us to use the Excel sumproduct function instead of having to write out all multiplications. Hence, the tool calculates the combined multiplier in fact as the exponential sum of log multipliers:

$$m = \exp\left(\ln\left(\frac{1}{3} \cdot m_1 + \frac{2}{3} \cdot \sum_{i=1}^{N} \ln(m_i)\right)\right)$$

The tool calculates the combined multiplier for each risk category, and only differs between risk categories to the extent the user selects some measures in which it already has invested; for these measures, the tool uses a unit multiplier (multiplication with 1).

In practice, the average accident reduction rates reported in the case studies vary between 6% (medical check-ups) to 61% (presence of OSH officers). Accordingly, the multipliers vary between 0.39 (presence of OSH officers) to 0.94 (medical check-ups). The log multipliers are negative and vary between ln (0.39) = -0.94 for the presence of OSH officers to -.07 for medical check-ups. The multiplier of the most effective measure is weighted fully ($1/3 \cdot m_1 + 2/3 \cdot m_1$) and all others with 2/3. This feature ensures that the accident reduction is always at least the value of the most effective measure, the weighting of the other values with 2/3 ensures that resulting minimum achievable accident rates are not too unrealistic.

Other measures include “adequate size and sufficient time of the crew”, ergonomics, periodic health checks and work communication / cooperation. The effectiveness of the first three is small according to case studies, but confirms work communication / cooperation to be very important to reduce the number of accidents at work.

However, the insurance premiums are actually quite low because of the own risk (the insured company pays for the first few sick days or the first few hundred euros of medical costs). Hence, the assumed 10% reduction of the insurance premium is more a small “well done” bonus than a substantial incentive to invest in accident prevention.

5.6 Calculation of costs and benefits

Cost factors apply to both costs of OSH investments and to costs of accidents (which are benefits of OSH investments if they reduce the accident rate). Since costs and benefits are the present value sum of all different types of costs and benefits, this chapter discusses the main underlying cost factors, and then briefly how the tool calculates costs of OSH investments and of accidents.

1. Assumed cost factors

The tool uses a large number of factors that determine the costs of investments and accidents. The sheet “Cost Factors” groups these factors together.

Price levels

First, price levels differ between countries, with typically the lowest price levels in Bulgaria and Romania and the highest price levels in the northwest of Europe. We use Eurostat price levels (“Purchasing Power Parities) per country for:

- Government services;
- Hospital services;
- Metal equipment.

The tool also uses Eurostat price levels for government services for business services such as lawyers and claims of victims or their family. It uses the Eurostat price levels for metal equipment used for machinery if broken down after an accident and for safety equipment in general.

The EUR exchange rate is also taken from Eurostat, March 2019. The sheet “MS Unit Costs” tabulates these data.

Labour costs and mark-ups

The sheet “MS Costs Data” tabulates labour costs of “craft and related trades workers”, of “managers” and “professionals” from the Eurostat Structural Earnings Survey (SES), which vary by country, subsector of construction and size class. These labour costs include both wages and employer contributions. The estimates use data of neighbouring countries to fill in blanks for missing data. The sheet “Cost Factors” takes the relevant hourly labour cost from this database, depending on the country, sub-sector and number of craft workers that the user supplied.

Further estimates in the sheet “Cost Factors” are:

- Ratios of productivity to labour costs according to Eurostat National Accounts data;
- Labour cost mark-ups for managers/professionals based on SES data;
- Overtime pay rates based on collective agreements or labour codes (depending on the country);
- The wage premium of a replacement worker is assumed to be 10% (because the replacement needs to be recruited at short notice); the likelihood that a worker needs to be replaced is based on the case studies of Task 4.

Administrative fines and costs of legal proceedings at company level

The system of administrative fines and legal proceedings varies across Europe. In many countries, negligent companies risk administrative fines, notably in the east of Europe. However, in Ireland, for example, negligent companies may more easily face court cases while in other countries negligence is more likely covered by the insurance system (though gross negligence is typically not).

Analysing the national systems of administrative fines and court cases, as well as collecting data on the corresponding costs for all EU Member States would be a study in itself. However, these costs can be substantial. Therefore, we analysed the system in the Netherlands only. The system in the Netherlands is that authorities may charge administrative fines to negligent companies. The tool presents the costs of these fines as an example, under the heading “Avoided penalties and cost of legal proceedings”.

In the Netherlands, the level of the fines depends on many factors, such as:

- Company size;
- Category of risk;
- Lack of measure;
- Severity of neglect;
- Severity of accident.

The sheet “Cost Factors” documents the level of the fine depending on the first three factors, and separately for the risks and for the lack of measures. The fines are the fines assessed to apply typically for the main categories in the Dutch OSH decree for construction.

Inspectors double the fine in case of severe neglect. In the Netherlands, the cause for accidents was unavailability of adequate protection in 40-75% depending on the type of accident. Considering as severe neglect, the tool assumes severe neglect to apply in 60% of the accidents.

In other accidents, the protection was available but not used (in most cases) or not adequately maintained (in a minority of cases) and we would classify this as less severe. Inspectors further quadruple the fines if the victim needed to visit a hospital. The tool assumes a visit to a hospital if the victim travelled by ambulance or needed emergency care treatment without transport by ambulance, on which Dutch statistics are available per type of risk. The sheet “Accident Costs” documents the resulting fines (columns AL to AO).

The tool does not include fines for not reporting an accident in the calculations, to avoid a discussion of the likelihood that inspectors discover non-reported accidents. Instead, a footnote to costs of “Avoided penalties and cost of legal proceedings” reminds the user or these costs. The fines for not reporting an accident varies between countries, and the tool presents these for Latvia where they range from EUR 750 to 1,500 per accident depending on the severity of the accident and for the Netherlands where they range from EUR 5,000 to 50,000 depending on the size of the company.

Note that administrative fines apply at the company level. A fine of a given amount thus implies a lower cost per worker for a larger company. The Netherlands compensate for this by charging higher fines are higher to larger companies. The fines are thus commensurate for period inspections, assuming that inspectors do not visit larger companies much more frequently than smaller ones. To the extent that inspectors issue fines after each accident, the higher fines for larger companies should actually imply higher costs, assuming the accident rate is the same and inspectors do not bundle accidents into one to determine the fine.

Insurance premium reduction

In some countries such as the Netherlands and Spain, insurance companies reward a lower than expected accident rate with a reduction of the insurance premium. A Spanish insurance company offers a lower insurance premium if the company submits a certificate of OSH compliance; a Dutch company offers a lower insurance premium if the accident rate in the past has been low. The tool assumes this reduction to be 10% based on examples provided by the Spanish insurer and assumptions of actuarial neutrality in the Dutch case.

After the first accident, the tool assumes that the insured company loses this insurance premium reduction. In order to calculate the present value of this cost of accidents, we first calculate the accident probability at company level. The more craft workers in a company, the higher this probability is. We then calculate the present value factor of the lost annual premium discount as the difference between two terms, as explained in the Annex of this Guideline.

The tool then multiplies the lost annual premium discount with this present value factor. The tool also calculates the probability of accidents per worker, but does not use it because insurance premiums are paid at the company level.

As it turns out, the benefits of insurance premium reduction are very minor compared to other benefits of OSH prevention. We include it because the literature mentions it as a potential benefit.

Miscellaneous assumptions

The sheet “Cost Factors” document further miscellaneous assumptions although some others are in the sheets “Accident Costs” and “Present Value of Accidents”. They include:

- Attending a funeral (hours) after fatality - per colleague of victim: 8 hours;
- Work hours per month: 165.5;
- Cost of gas to bring colleague home (20 km to doctor, 20 km to victim's home, EUR NL 1.50 per km): EUR 60;
- Penalty for late delivery per day, as % of project value: 0.25% (based on various cases in desk research);
- Max. number of workers affected by interruption or temporary shutdown: 50;
- Value of loss of worker morale / clients after a fatal accident: EUR 50,000;
- Civil claim of family after a fatal accident: EUR 100,000.

In addition, for costs on the day of an accident and for costs of an accident investigation a mark-up of 20% is assumed for costs not covered by the framework (we tried to be complete but acknowledge we may miss some).

With regard to months of temporary presenteeism (productivity loss when the worker returns to work after an accident before being fully recovered), construction companies report values ranging from 0 to 3 months in the case studies, depending on the type of risk. For the moment we assume 2 months of presenteeism for all types of risks, but this value is likely to be adjusted downwards for most risks after all case studies have been completed.

2. Calculation of costs of OSH investments

For each measure and risk, the framework distinguishes the following types of costs in the sheet "Costs of OSH Measures":

- Purchase of material / services;
- Annual maintenance / writing off cost of material;
- Hours of initial preparation by management;
- Annual hours of updating/monitoring by managers;
- Annual hours of participation per workers (training);
- FTE and training of OSH officers (on-site OSH management).

We are not aware of EU studies on costs of OSH measures in construction. For example, ESENER studies[68] report which proportion of companies (across all sectors) did a risk assessment and which proportion provided OSH training, but not the costs in terms of hours involved. Therefore, we collected data on this through desk research and case studies.

For each measure, the tool estimates whether it is most cost-effective to make the investment in-house or by purchasing a service. For example, for risk assessment, the tool assumes that purchasing handbooks is more cost-efficient than assessing the risks in-house. For another example, consider scaffolding. Scaffolding in itself is not an OSH measure; only additional investments in proper (safe) scaffolding are an OSH measure. Initially, the tool included the cost of lattices, handrails, safety clams and corner clams as OSH investments. However, in Task 4 multiple construction companies stated that these are all standard parts of scaffolding, and only considered telestabilizers as a true OSH investment. In reality, many companies outsource scaffolding. In that case, the tool assumes the price of telestabilizers is included in the price of outsourced scaffolding.

Purchase of material / services and annual maintenance are determined for each risk. This is explicitly the case for the purchase of safety equipment. For other measures, the purchase of material or services is actually determined for the total of all risks and then allocated to the individual risks. For example, the cost of training in safety competences is EUR 240 in the Netherlands. The tool allocates this to individual risks based on a guess of pages/time devoted to it. Note that although the sheet "Costs of OSH Measures" uses the costs for the Netherlands, the tool ultimately adjusts the costs for differences in price levels between countries. The tool assumes the annual maintenance cost of safety equipment to be 10% (large construction companies employ repair people to maintain equipment).

[68] See https://osha.europa.eu/en/publications/management-occupational-health-and-safety-european-workplaces-evidence-second-european/view

For the other types of costs, the sheet “PV of OSH Investments” allocates costs to risks categories commensurate with accident rates. In this sheet, the Present Value factor, the price level factor and the EUR exchange rate are also applied.

3. Calculation of benefits of OSH investments

The main benefit of OSH investments is the reduction of the accident rate. Chapter 2 above already discussed indirect benefits, so this section only discusses direct benefits.

Insurable costs: sick leave and medical costs

The insurable costs are the costs of sick leave (number of sick days minus the own risk times the labour cost) and medical costs for treating the victim (minus the own risk). If the company is not insured, the own risk is equal to the full number of sick days and the full medical costs.

In most countries, social insurance covers sick pay. This means that the State pays for days in which sick workers recover. However, again in most countries the employer needs to pay a percentage of the wage during some period. This period typically starts after a “waiting period” during which the worker receives no pay. This waiting period varies typically between 0 and 3 days. From day 1 up to 4, the employer needs to pay sick leave for typically one or more weeks, but up to one or two years in some countries. The employer can in theory offer to pay a higher percentage, to top-up the State sick pay, or to pay during the waiting period. However, in the tool we assume that the employer does not pay more than legally required. If the employer is not insured, he starts paying from the day after the waiting period, up to when the worker returns to work or the State takes over, whichever happens first. In the tool, we take the minimum of the average sick days after the waiting period and the maximum employer payment period, depending on the type of risk.

In many countries, employers can insure this risk with a private insurance company. For example, if an employer needs to pay sick pay for up to six months after the waiting period, he may insure this risk. An insurance company may require the employer to pay the first few days of sick pay and take over payment if the sickness lasts longer. The first few days that the employer still needs to pay, is called the own risk. The higher the own risk, the lower the insurance premium. If the employer is ensured without an own risk and without premium reduction as a reward for a low number of accidents, the number of accidents has no impact on costs of sick pay. If there is an own risk, the tool takes the minimum of the average sick days after the waiting period and the own risk, again depending on the type of risk. The number of sick days is determined per risk category based on a Dutch report – we could find no such data per risk category in construction at the EU level.

As far as we know, there is no EU country in which private insurance against sick pay is compulsory, and hence the tool offers an option for companies to indicate whether they are insured against sick pay or not.

Public healthcare is typically “almost” free in most EU countries, apart from limited patient charges. However, if an accident at work causes medical costs, the employer may need to pay for the costs of medical care. In fact, some countries such as Slovakia require employers to insure against this risk. In other countries, a general (compulsory) employer liability insurance covers this risk. In countries where the employer need not pay for medical costs caused by accidents at work, the State implicitly insures the medical costs. The study did not investigate this for each country, and the tool simply offers an option for the company to check whether it has insurance against medical costs or not.

Dutch data are available on the frequency of the type of medical aid and the average number of hospital days per type of risk for the following:

- First aid only;
- General practitioner;
- Emergency care;
- Ambulance (on top of emergency care).

A colleague typically provides first aid and the company bears the costs of first aid supplies regardless of whether it has insurance against medical costs. The case studies of Task 4 provided data on this. Because all interviewed companies had insurance against medical costs, internet search was the basis for costs of other types of medical aid and the cost per hospital day. An insured company still bears part of the other medical costs, namely the minimum of the own risk and the actual medical costs.

Non-medical costs on the day of the accident

Apart from the medical costs, which the tool allocates to the day of the accident (even if more than one hospital day), the framework distinguishes two types of non-medical costs on the day of the accident:

- Hours of work interruption;
- Bringing the victim to the hospital (if taken to a doctor but not by ambulance) and home.

The hours of work interruption are fictive and vary from 0 hours to overworked (assuming the victim just calls sick) to 8 hours after a serious accident such as falling from a great height (assuming the whole work day is lost). These hours apply to the whole work force on the site, up to the maximum number of craft workers in the firm or 50, whichever is the smaller.

It is assumed that one colleague brings the victim to the doctor and then to home, and that this takes 8 hours. The hours of general work interruption are subtracted from the hours of bring the victim to the doctor and then home to avoid double counting.

Accident investigation

Accident investigation includes the following activities:

- Colleagues viewing and fixing the site;
- Time to assess damage, order parts or repair;
- Accident investigation by management;
- Reporting the accident to authorities;
- Repeated risk assessment;
- Extra repeat training of all staff.

The case studies of Task 4 provided data on hours spent after each accident for some of the above categories. For repeat training after an accident, most companies report zero hours or one hour. Because OSH officers continuously assess risks, the tool allocates no extra costs to this category, but combines this with higher management involvement in an accident investigation. Interviewees reported a wide range of hours varying from zero to eight hours, and the tool uses the average. For viewing and fixing the site, time to assess damage and order parts or repair, and for reporting the accident to authorities the tool uses unconfirmed hours.

Worker replacement costs during victim's recovery

If the worker is absent for more than one day, it depends on the type of worker whether he needs to be replaced, according to the case studies of Task 4. Some companies report that they replace workers during their recovery and others do not. The tool uses the percentage of companies that replace victims of accidents during their recovery as the likelihood of worker replacement. The tool also assumes that the sick pay leave insurance does not cover the wages of the replacement

worker. The wage cost of the worker replacement is thus the number of sick days multiplied by the worker's salary. In addition, a replacement wage premium may apply because the company hires the replacement worker at short notice. The tool assumes a fictive 10% wage premium.

In addition, the replacement worker needs to receive basic training involving both him and the foreman (assumed to cost a fictive 8 hours each), and hours for additional instructions of the replacement worker in the general course of work (assumed to cost an additional 2 hours each).

Costs of administrative fines and legal proceedings

Earlier sections of this chapter discussed the costs of administrative fines. In addition, costs of administrative and legal procedures include potentially:

- Hours of manager involved with legal proceedings if any;
- Costs of civil litigation (lawyer);
- Work shutdown by authorities after accident until OSH compliance;
- Average civil claim of victim for occupational disease;
- Average civil claim for property damage or injury by third persons.

The tool only assumes these costs for very serious accidents in a limited number of risk categories. The exception is civil claims for occupational diseases where in addition the tool assumes different values of claims per risk.

The tool assumes that the likelihood of a shutdown by authorities is 5% after an accident for six out of 16 risk categories because it occurs sometimes. None of the companies in the case study reported a civil claim procedure, but it is questionable if they would do so. Because claims sometimes occur according to literature, the tool again assumes a 5% probability after an accident for a limited number of risk categories.

The tool assumes a civil claim for specifically property damage or injury of third persons applies only to the risk of objects falling from great height and pinching or hits by shot away objects, in 10% of the accidents caused by this. Think for example of a crane that falls on parked cars, or someone hit by a construction vehicle.

Project delay costs

Lastly, the time lost may result in a project delay, and the company may have to pay a penalty for late delivery. This company does not avoid this penalty by hiring a replacement worker because the replacement worker only covers the work of the victim after the accident, not the time lost by the whole work crew due to work interruption, accident investigation and possibly an extra training.

The options for project delay that the user can choose include:

- Overtime work;
- Paying the late project delivery penalty.

Of course, it is also possible to hire a second replacement worker to recover lost time. This option should be more expensive than overtime work because this involves extra recruitment and training costs, and is therefore not considered.

Clients can specify project delay penalties in different ways. A customary approach is to specify costs per day. In several examples, these range from $ 20-80 per day for each $ 100,000 in

construction price.[69] This corresponds to 0.02 – 0.08% of the project value for each day of delay. The actual delay depends on the number of accidents and the average delay caused by each accident. We also found an actual contract with a late delivery penalty of 0.25% of the project value. Rather than estimating the days of delay, we assumed a fixed delivery penalty of 0.25% of the project value.

5.7 Use of case studies in framework

Information from case studies was essential to populate some parts of the framework. In addition, case studies were used to validate information from desk research. Essential information from case studies includes:

- Number of OSH officers in companies of different sizes and sectors. It was observed that in small companies OSH officers only dedicate part of their time to OSH control. On average, one FTE is dedicated to OSH control per 100 craft workers in a company;
- Costs after an accident such as extra training, lost hours of work for colleagues of the victim, first aid expenses, hours of repeated risk assessment, whether replacement staff is hired;
- Information on indirect benefits:
  - Change in efficiency;
  - Lower absenteeism;
  - Less staff turnover;
  - More projects / less idle time between projects.
- Typical investments in OSH (e.g. hours of training, development of procedures, hours of management involvement;
- The insight that training is a repeat cost, including training of OSH officers;
- The lifetime of heavily used equipment (as opposed to lifetimes promoted by shops).

Useful validation of desk research includes:

- Equipment prices;
- Percentage point reductions by which measures reduce the accident rates;
- Differences in accident risks between sub-sectors (building construction, civil engineering and specialized construction).

The approach from each piece of information from the case studies was as follows:

1. Tabulate the values of all case studies;
2. Search for differences between company sizes and sub-sectors that jump to the eye;
3. Calculate averages across all case studies:
   - Extreme values (more than 2x as high as the second-lowest value) are not used in the calculation of the average;
   - Values from desk research are counted as one case study;
   - For equipment prices, averages are calculated per sub-sector.
4. In the appropriate place in the framework, refer to these average values.

[69] https://wma-online.org/for/for-designers/tech-articles/liquidated-damages-for-delay-in-construction-contracts/
https://www.montrosecounty.net/DocumentCenter/View/823/Sample-Construction-Contract

6 Case studies

In this chapter conducted case studies are presented. The aim of conducting case studies is to test the framework in practice and demonstrate its relevance and practical usefulness.

6.1 Approach for the case studies

In order to find information on the business case for OSH, 20 case studies were conducted, with a range of companies, from micro companies over small- and medium sized enterprises to larger companies. The companies operate in various sub-sectors and Member States. This work supported the refinement of the financial framework with a broad set of practical company data as well as highlights different approaches by companies towards OSH.

The case studies were done by country experts in the native language of the interviewed companies across various Member States. The aim was to have a sample of cases with a good representation from EU Member States. In addition, the cases aimed to cover the various sub-sectors of construction and the different sizes of companies with a focus on SMEs.

6.2 Overview over the case studies

Before presenting the aggregated findings, the table below highlights the companies interviewed and some general information about them. Please note that some companies asked not to be named in the report and are therefore anonymised.

Member State	Company	Size[70] (Number of employees	Sub-sector(s)[71]
Austria	PORR AG	Large (19 000)	• All
Bulgaria	GP Group JSC	Large (595)	• F41 – Construction of buildings • F42.1 – Construction of roads and railways
Bulgaria	Parsec Group Ltd.	Medium (80)	• F41 – Construction of buildings • F42.1 – Construction of roads and railways • F42.9 – Construction of other civil engineering projects • F43.3 – Building completion and finishing
Denmark	Anonym	Medium (180)	• F41 – Construction of buildings • F42.1 – Construction of roads and railways • F42.2 – Construction of utility projects • F42.9 – Construction of other civil engineering projects • F43.3 – Building completion and finishing
Estonia	Anonym	Small (16)	• F41 – Construction of buildings • F43.3 – Building completion and finishing

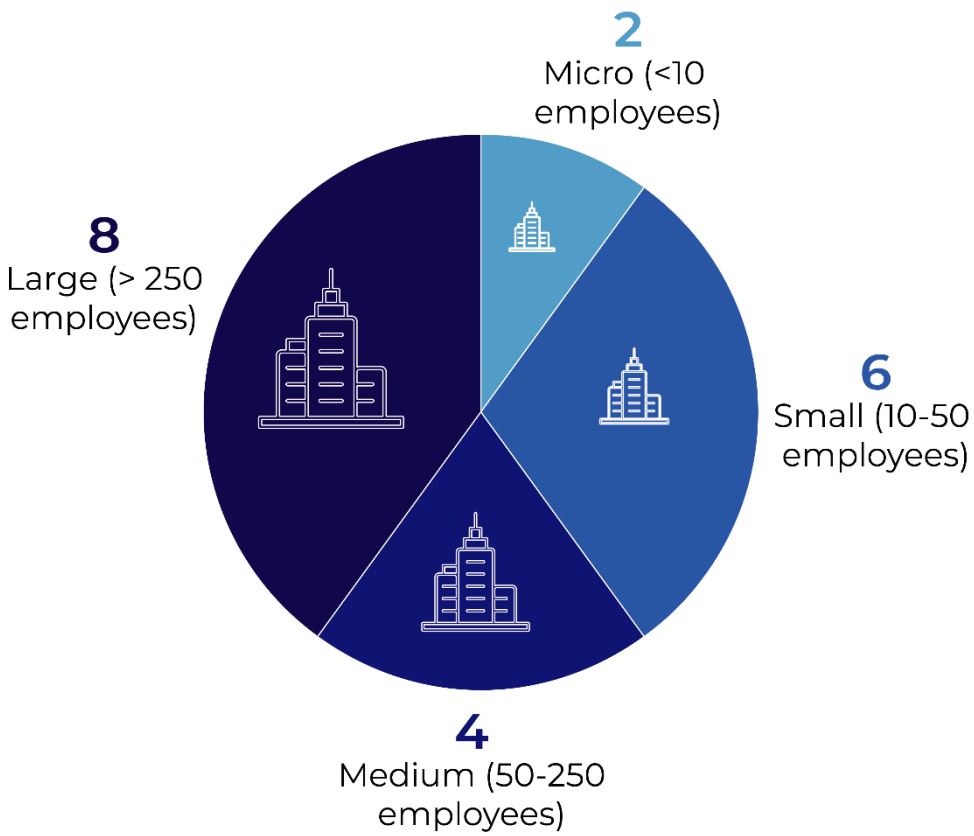
[70] Micro (< 10 employees), Small (10-50 employees), Medium (51 - 250 employees), Large (> 250 employees).

[71] The sub-sectors relate to the NACE categorisation for construction (NACE code F) and its sub-codes (F41 – F43.3)

Member State	Company	Size[70] (Number of employees	Sub-sector(s)[71]
Finland	Anonym	Small (40)	• F41 – Construction of buildings • F43.1 – Demolition and site preparation • F43.3 – Building completion and finishing
France	Leon Grosse	Large (2 300)	• F41 – Construction of buildings • F42.2 – Construction of utility projects • F42.9 – Construction of other civil engineering projects • F43.2 – Electrical, plumbing and other construction installation activities • F43.3 – Building completion and finishing
Germany	Mainka Bau GmbH & Co. KG	Large (>600)	• F41 – Construction of buildings • F42.1 – Construction of roads and railways • F42.2 – Construction of utility projects • F42.9 – Construction of other civil engineering projects
Greece	Hatel	Micro (8)	• F43.2 – Electrical, plumbing and other construction installation activities
Latvia	Anonym	Medium (124)	• F41 – Construction of buildings • F42.1 – Construction of roads and railways • F43.1 – Demolition and site preparation • F43.2 – Electrical, plumbing and other construction installation activities • F43.3 – Building completion and finishing
Latvia	Bukoteks Ltd.	Small (20)	• F41 – Construction of buildings • F42.9 – Construction of other civil engineering projects • F43.2 – Electrical, plumbing and other construction installation activities
Latvia	Alfarent Ltd.	Small (39)	• F43.1 – Demolition and site preparation
Lithuania	Anonym	Large (270)	• F41 – Construction of buildings • F43.2 – Electrical, plumbing and other construction installation activities • F43.3 – Building completion and finishing
Lithuania	UAB Medžio forma	Micro (5)	• F43.2 – Electrical, plumbing and other construction installation activities • F43.3 – Building completion and finishing
Malta	Anonym	Large (340)	• All but F42.1 – Construction of roads and railways
Netherlands	Strukton Rail	Large (2500)	• F42.1 – Construction of roads and railways
Poland	Roma Bud	Small (45)	• F41 – Construction of buildings
Poland	Anonym	Large (400)	• F41 – Construction of buildings • F43.3 – Building completion and finishing
Slovakia	EUCOS SK s.r.o.	Small (50)	• F42.2 – Construction of utility projects • F42.9 – Construction of other civil engineering projects • F43.1 – Demolition and site preparation • F43.2 – Electrical, plumbing and other construction installation activities • F43.3 – Building completion and finishing
Sweden	Anonym	Medium (145)	• F41 – Construction of buildings • F43.1 – Demolition and site preparation

The companies interviewed come from every corner of the EU. While obviously 20 case studies cannot cover every Member State, we aimed to include companies from across the EU's different regions. For this balanced approach we relied on local country experts to do the interviews in the native language of the company. In addition, a balance in terms of size of companies was aimed for. While the main target of the study are SMEs, most information about costs and benefits of OSH can generally be gathered from larger companies as these collect more data. Therefore, interviews with such larger companies were also included, while also considering micro, small and medium sized companies as these have insights on the typical OSH risks and motives for small companies. In the end, a well-balanced distribution of company sizes was reached (See Figure 6.1).

Figure 6.1 Equal distribution between SMEs and large companies



We aimed as well to have an equal distribution across the different sub-sectors of construction as companies face different risks and costs depending on which sector they are active in. For example, civil engineering companies have higher risks of accidents with heavy machinery, while for building construction the highest risk generally is falling from heights. Meanwhile, some specialised companies working in electrical engineering or at petrochemical plants have again very different risks (electrocution, contact with dangerous substances). In the end, though most companies (especially the medium and large ones) work in several sub-sectors simultaneously. The table below highlights the spread across sectors.

Table 6.1 Sector spread of interviewed companies

Sector	Count	Sub-sector	Count
F41 – Construction of buildings			**15**

Sector	Count	Sub-sector	Count
F42 – Civil engineering	**21**	F42.1 – Construction of roads and railways	7
		F42.2 – Construction of utility projects	6
		F42.9 – Construction of other civil engineering projects	8
F43 – Other construction activities	**28**	F43.1 – Demolition and site preparation	7
		F43.2 – Electrical, plumbing and other construction installation activities	9
		F43.3 – Building completion and finishing	12

Note: Companies could name several sub-sectors, therefore the total count of answers is with 64 above the 20 case studies.

6.3 Aggregated findings from the case studies

In this section, the findings across the case studies are presented along several thematic fields. The filled-in case study templates for each company can be found in Annex 4. Please note, that some aspects of these interviews (e.g. regarding investments into OSH) went directly into refining the financial framework presented in Chapter 5.

For some countries no data on company investments into OSH are presented, due to the possible sensitive nature of this financial information. These data were used to refine the financial framework, but removed from this section as well as Annex 4.

Motives to invest into occupational health and safety

Companies invest into OSH for many reasons. For most companies the main motive is the **safety of workers** with 18 companies mentioning it as a motive to invest into OSH. However, a lot of companies mentioned also **legal compliance** (11 times) and the **company's reputation** as well as the **quality of work** (both 6 times) as motives. However, companies mentioned a great variety of reasons to invest into OSH with many of them indicating that it is difficult to limit oneself to three main motives.

"Keeping our workers in business and motivated is an important priority. It is hard to find specialists in telecommunication platforms that are willing to work at height or in an isolated mountain in winter, being ready to travel at any time" (Hatel, Greek micro enterprise in electrical engineering)

Table 6.2 Motives to invest into OSH according to interviewed companies

Motive for investing	Times mentioned
Safety of workers	18
Legal compliance	11
Company reputation	6
Quality of work	6
Worker loyalty	5
Avoiding accident costs	4
Comply with certification	1
Other mentioned	Intrinsic motivation; improved planning and processes

Note: Companies were asked to name their three main motives to invest into OSH.

Common risks faced by construction companies

All companies are concerned with the possibility of accidents. **Typical risks** mentioned by companies (in order of frequency) are falling from heights, collisions with heavy machinery, slipping and tripping, overall negligence, musculoskeletal disorders, cuts from tools, electrocution and more. Risks vary depending on the type of work a construction company engages in. However, across

companies proper instructions and communication, training and safety equipment help minimise and manage these risks. In fact, companies note that their **major needs** are to increase awareness among workers, cooperation and communication on construction sites and establish an overall safety culture in the company.

"The technology and equipment is there but the missing factor is the human one" (Mainka Bau GmbH & Co. KG, German large sized company working often at industrial and petrochemical plants)

Table 6.3 Risks commonly faced by construction companies

Risk	Times mentioned
Falling from heights	16
Collisions (e.g. with heavy machinery)	5
Slipping & tripping	5
Negligence	4
Musculoskeletal Disorders	4
Cuts or other injuries from tools	4
Electrocution	4
Poor planning	3
Lack of communication	3
Long-term exposure (weather, physical stress)	3
Exposure to dangerous substances	3
Falling objects	3
Eye injuries	2
Traffic accidents	2
Broken machinery	2
Buried under objects	1
Noise	1

Note: Companies were asked to name up to three of their greatest risks.

"The overarching problem identified at the company was poor rate of safety culture amongst the workers. It was stated that while all the necessary protective equipment and materials are readily available to the workers, many fail to use them. As such, while ensuring that workers use protective equipment is the primary responsibility of team supervisors, the OSH officers randomly visit different sections of the production lines to monitor usage of protective equipment and to encourage workers to adhere to safety standards." (Polish large sized company working in building construction)

Benefits experienced by companies

We also asked companies to share their experiences on benefits from implementing OSH measures. While it is difficult to measure the exact benefits, companies were eager to share their estimates. Fifteen companies agreed that they benefited from **accident avoidance** by decreasing minor and major accidents. The remaining five companies were unsure as they had no accidents. One larger company mentioned that over the past years they reduced accidents by 30%, while a medium-sized company estimated their annual savings at EUR 50 000.

Eighteen companies reported that OSH measures actually **improved efficiency and productivity.** One company mentioned that OSH procedures cost time and therefore might reduce efficiency. Another company did not know. Of those reporting efficiency gains, the efficiency gains ranged from 2% to 70% with an average gain of 22%. One Swedish SME mentioned that as a result of their

investments into OSH everyone on site knows what is expected of them making projects start more efficient.

"The changes and improvements in OSH resulting from joining the nationwide initiative have been significant and had huge impact on the safety levels. Spill over effects within the company were observed where better standards further expanded to other construction sites." (Roma Bud, Polish SME in building construction)

The majority of companies also experienced a **reduction in absenteeism** (11 companies out of the 20 with four unknown) with a reported average of the positive impact being 12%. In addition, all but four companies reported to have **more projects and reduced the idle time** between projects thanks to reputational effects and improved processes. Positive companies reported project wins that resulted from their OSH reputation with average increase in turnover of 8%. One large Austrian company mentioned that they recently won two projects with a combined value of EUR 30 million due to their good safety performance outbidding cheaper offers. Finally, the majority of companies (11) reported to have experienced a **reduction in hiring costs and staff turnover**. For this benefit, it was difficult to estimate by how much, but overall companies were here positive too that their OSH performance had a positive impact. One German company with 600 employees mentioned that they have about 2000 applications a year, which they also attribute to their good OSH reputation.

"The combination of company own initiatives and external ones are recognised as adding up to stronger OSH performance, better organisation, better staff morale, better management of staff and reduction in accidents and absenteeism" (Danish SME in civil engineering and building construction)

In conclusion, the implementation of OSH measures is beneficial for companies, not only directly (through accident prevention) but also indirectly (through efficiency, worker loyalty and reputation). Our research showed that next to societal, social and legal reasons there is a clear business case for companies to invest into OSH.

7 Stakeholders' consultation and communication

This chapter presents the main discussion points that were discussed at three stakeholder meetings that were organised around the different elements of the study. The aim of the stakeholder meetings was: 1) to consult stakeholders on the study development and receive feedback for the development of the framework and 2) to promote the study and thereby the handbook. The meeting minutes for all stakeholder meetings are attached in Annex 5.

7.1 Meeting 1: Mapping and Taxonomy

The first stakeholder meeting was held on 13 March 2019. The study team presented the mapping of OSH initiatives, as well as the taxonomy of costs and benefits of OSH standards. Next to that, two guest speakers were invited to present their work on the topic. The first speaker, a researcher, presented his work on a business case for safety and health at work. The second, for the German statutory accident insurance (BG BAU), presented the insurance's programme on Human Factors in Prevention: 'Build on safety. Build on yourself.'

The Head of Unit of DG GROW C.1 opened the meeting by highlighting the construction sector's importance in dealing with many different challenges such as sustainability, quality of life and employment. The sector has a central role in addressing these challenges, but simultaneously is itself plagued by a skill shortage and poor public perception caused by tough working conditions. The stakeholder meeting and the project are part of address these two issues by contributing towards better occupational health and safety in construction.

The study team then presented the **mapping of OSH initiatives**. For the mapping, the research approach was based on a first round of desk research, and a second round where country experts dug deeper to supplement the first findings. The mapping tool uses a logic chain (aim – activities – outcomes) that reflects on costs and benefits. Concluding the presentation, it was noted that logic chains are easier to define for specific (targeted) initiatives than for general OSH ones, since the desired outcome and instrument for change are clearer defined. Moreover, the main actors in these initiatives seem to be larger companies, while it is unclear whether transferability or outreach to SMEs are considered. However, SMEs are potentially beneficiaries of accreditation or certification schemes that aim to create a level-playing field across the sector.

The stakeholders commented on the mapping with some suggestions, for example regarding additional factors to look into, such as company reputation, but also to take into account the large difference between initiatives. For example, initiatives may be initiated by companies themselves, or sector-wide. Related to that is the sponsor of initiatives; benefits for companies may be higher in cases where the state pays for a large part of the initiative. This may impact the results, and may lead to a situation in which state funding will be promoted or necessary, while the aim should be that companies take up initiatives by themselves.

Thereafter, the study team presented the **taxonomy of costs and benefits** of investing in OSH. After listing some of the heightened OSH risks in construction (ongoing transformation of the work site, macho culture, many SMEs and micro firms, migrant workers, etc.), the team presented the preliminary costs and benefits:

- *Direct benefits* come from the reduction in workplace accidents, and thereby the reduction in insured and non-insured costs;[72]
- *Indirect benefits* are derived from enhanced productivity, enhanced company reputation and stronger performance and quality of services (as perceived by clients in reduction of defects);
- *Direct costs* stem from participation costs in OSH initiatives (staff time, training costs, new equipment, etc.) and the ongoing costs from accidents that are not avoided;
- *Indirect costs* are opportunity costs from missing investments used for the OSH programme for other commercial activities.

An important point regarding the taxonomy was raised in the discussion, namely that the taxonomy would be difficult to implement if only costs that arrive at company level are taken account, since many benefits of OSH measures can be very long-term. For example, work related cancer is currently a major issue. Avoiding long-term sick leaves is something companies could benefit greatly from (especially in countries where companies pay for long-term sick leave), however these costs are often not considered.

7.2 Meeting 2: Financial Framework and Case Studies

The second stakeholder meeting was held on 21 May 2019. The study team presented the framework for financial analysis and assessment and the approach to the case studies. Next to the study team's presentations, two guest speakers were invited. The first, a researcher, presented about return on investment in prevention - from theory to practice. The second speaker, an OSH practitioner, presented the Bambus initiative and its risk assessment procedures on construction sites.

The meeting was opened by DG GROW by welcoming all participants and explaining the purpose of the study. It was stressed that the motivation for the study was that health and safety are often seen only as obligations for companies, which neglects the business case behind many OSH prevention measures. Therefore, this study focuses on the financial viability of OSH measures and on preparing guidelines for companies to invest in OSH in a profitable manner. The idea is neither to question legal obligations nor to neglect other positive outcomes of OSH in regard to environmental and social aspects. These are valid reasons for companies to implement OSH measures. However, this study aims at adding an economic reason to investing into OSH.

The study team demonstrated in its presentation the **financial framework**. The framework takes a company perspective and therefore does not include societal and worker costs or benefits. However, it considers many different factors and users can select various inputs (e.g. number of employees, three different construction sub-sectors, combinations of different OSH measures, Member State the company is active in). The key outputs of the framework are the accident rate before and after a measure as well as the net present values of costs and of benefits. A few first insights were also presented. For example, not all risks are equally relevant for all sub-sectors, preventing multiple risks is more effective than one due to shared costs, costs per worker (for procedures, management, certification or fines) depend on firm size and finally accident reduction is more beneficial in Western Europe due to the higher labour costs. Finishing the presentation, the

[72] The distribution of these costs depends on the specific national situation in a Member State, the development of its insurance market and national regulations.

study team displayed the current framework to participants and explained how it could be used and how one can change different variables.

Stakeholders were mainly concerned that the framework would be too complex for companies to use it. The contractor and the European Commission clarified that this complex framework is only the first step. A second step, will be adapting and simplifying it based on stakeholder feedback and feedback from case studies. In regard to this, it was added that it will also be important to keep it **updated**, since risks and fines change over time. Another point of concern voiced, was the possibility of having **negative outputs** in terms of the probability of OSH measures, especially in countries with low labour costs. It was worried that this might be counterproductive in promoting OSH measures that go beyond minimum legal compliance. Here the study team responded that indeed the framework is a two-edged sword and that negative outputs are possible in its current state. Future versions potentially could only show positive investments or one could also draw policy conclusions from negative ones, designing policy around it (e.g. by increasing fines for OSH obligations were investments do not pay-off).

The final presentation was on the approach, **selection criteria and status of the case studies**. As part of the study, 20 case studies will be conducted on-site with companies that have recently or are currently implementing an OSH initiative. These initiatives should go beyond pure compliance with legislation. Input from the case studies will also be used to update and adapt the financial framework where necessary. A challenge has been to motivate companies to participate and explain the purpose of the framework. In order to alleviate this, the contractors will make use of the contacts made during the mapping and ask country experts to identify fitting companies. Participants of the meeting were also invited to put forward potential contacts.

In the discussion, the study team clarified the approach to the interviews, including the selection criteria for case studies: EU geographical coverage, type of OSH risks, balance of company sizes and balance of sub-sectors and professions. The importance of targeting SMEs was stressed, as these would need to relate the most with the outcome of the study. The contractor agreed and noted that the target is to have most of the case studies with SMEs.

7.3 Meeting 3: Dissemination and validation

The third and final stakeholder meeting was held 23 October 2019. Its purpose was to present and discuss the draft final results of the study, namely the financial framework for assessing costs and benefits of OSH investment as well as the practical handbook for its dissemination. Based upon the feedback received during the discussion, the team then could finalise both deliverables. Towards this aim the study team presented an updated version of the financial framework as well as on the study's overall outcomes including the results from the case studies and a concept of the handbook. In addition, a guest speaker from Strukton Rail presented on the practical use of the framework as well as on innovative OSH approaches at Strukton Rail. Finally, a panel discussion was organised to discuss the findings of the study and finalisation thereof.

These results were used to update the work on both deliverables. For a full overview of the presentations and discussion during the third meeting see Annex 5. A short summary, is here below.

The Head of Unit of DG GROW C.1 stressed the importance of preparing the construction sector for the future. One particular challenge the sector faces is a skills shortage. This is partly due to public perception about poor working conditions and performance in OSH. For companies there are

many motives to invest into OSH, however most companies see it as an obligation or as ticking boxes and not as an opportunity. The study's aim is to show companies the economic benefits of investing into OSH prevention measures. It should be noted that the study cannot cover all costs and benefits.

The study team presented on their work **updating the financial framework**. It was reiterated that many studies exist on macroeconomic and societal benefits, but that the financial framework takes the company perspective. The team highlighted the changes that have been incorporated based on the case studies and the comments from stakeholders. Some of the main comments addressed, were the complexity of the framework and that there is too much of a focus on accidents over diseases. These have been addressed by simplifying the input and adding short-term diseases (not enough data is available on long-term diseases). Additional Member State data was also added to better reflect different situations across the EU. Moreover, negative results are not directly displayed and the calculations on sick leave pay were adapted. Finally, the framework was enriched by adding OSH officers as an investment category and by using not only statistics from social insurance but also worker reports (which includes also accidents that caused less than three days of sick leave).

In the discussion it was raised that it is important to be open about the limitations of the financial framework and that there is a need to follow-up on this after the conclusion of the study. A financial framework as an Excel tool can only be a first step to pilot if it is possible. After this first step, one needs to work on the tools current limitations and develop it into a more practical tool by for example turning it into a web application.

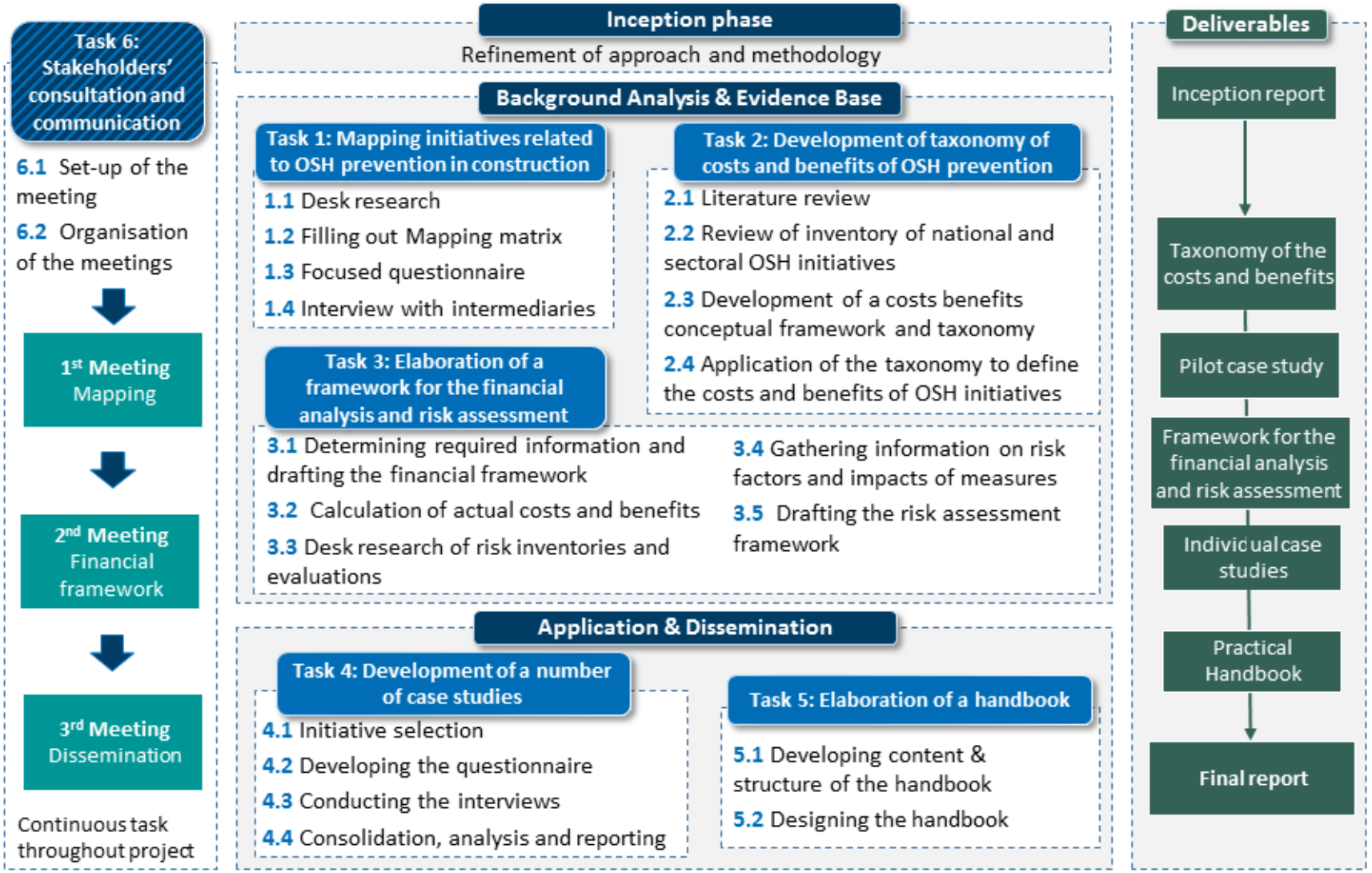
The team then presented the **overall outcomes of the study**: starting from the mapping of about 100 OSH initiatives across the EU, over the taxonomy of costs and benefits of OSH measures to the financial framework. Some results were highlighted as well as examples from the company case studies. The three main motives for investing into OSH among the interviewed companies are the safety of workers, legal compliance and company reputation. In contrast, the three main risks reported are falling from heights, accidents with heavy machinery and slipping and tripping on construction sites. One aspect mentioned by several companies was the need for more awareness and a safety culture in which workers report incidents actively. All companies interviewed were also very positive about investing into OSH and most agreed that it decreases accidents and provides benefits from increased efficiency and reputation. Concluding the presentation, a concept of the handbook, its overall structure and draft contents were presented. The overall idea of the handbook is to show to companies the business case behind OSH while also flagging non-economic benefits such as societal ones.

In the discussions, stakeholders agreed that OSH needs to become part of the larger picture of doing business. In order to do that, the handbook should highlight positive cases and the benefits mentioned by companies. Especially if these benefits go beyond accident reduction. The idea of adding requirements from larger contractors, clients or in public procurement was also raised as a possible solution to improve OSH. However, it was cautioned that one should not put too much pressure on SMEs as these might struggle with too many requirements.

Annex 1: Methodology

Our specific approach per task is described in the following figure.

Figure A.1.1 Task flowchart



Annex 2: Present value (PV) and probability calculations

Geometric formulas

For the summation of probabilities over workers and the calculations of Net Present Values, the tool uses the following formula for the sum of a geometric progression for a ≠ 1:

$$\sum_{i=m}^{n} a^i = \frac{a^m - a^{n+1}}{1-a} \tag{1}$$

A related formula that we use to calculate an insurance premium penalty after an accident is[73]:

$$\sum_{i=0}^{n-1} i \cdot a^i = \frac{a - na^n + (n-1)a^{n+1}}{(1-a)^2} \tag{2}$$

If each of n workers in a company has independently of the others a probability of an accident of p_w, then the probability p_c of an accident at the company level is:

$$p_c = \sum_{i=0}^{n-1} p_w \cdot (1-p_w)^i = 1 - (1-p_w)^n \tag{3}$$

For example, if for each of 4 workers in a company the risk of an accident is 7.5%, then the risk of an accident at company level is 26.8%, slightly less than 4 x 7.5% = 30%. For a company with 49 workers the risk of an accident is 97.8%.

NPV calculations

The net present value (NPV) of a recurrent cost *c* with time horizon *n* and discount rate *r>0* is using (1) with a = 1/(1+r):

$$NPV1 = \sum_{t=0}^{n} \frac{c}{(1+r)^t} = \begin{cases} \frac{c \cdot (1+r)}{r} \cdot \left(1 - \frac{1}{(1+r)^n}\right) & if\ r > 0 \\ n \cdot c & if\ r = 0 \end{cases} \tag{4}$$

Lastly, the NPV of an increased insurance contribution *c* from the first accident at company level onwards is using (2) and (3):

$$NPV2 = \sum_{t=0}^{n} p_c \cdot (1-p_c)^t \cdot \sum_{u=t}^{n} \frac{c}{(1+r)^u}$$

$$= \begin{cases} \frac{c \cdot p_c \cdot (1+r)^2}{r \cdot (p_c + r)} - c \cdot \left(\frac{1}{r} - \frac{(1-p_c)^{n+2}}{p_c + r}\right) \cdot \frac{1}{(1+r)^n} & if\ r > 0 \\ c \cdot (n+1) - c \cdot \left(\frac{1 - (1-p_c)^{n+1}}{p_c}\right) & if\ r = 0\ and\ p_c > 0 \end{cases} \tag{5}$$

Note that if the probability of an accident is near one as is the case for big companies, then the insurance contribution increases from year 0 onwards, and NPV2 reduces to NPV1. On the other hand, if the probability of an accident is 0 then also NPV2 = 0.

[73] https://en.wikipedia.org/wiki/Summation

Insurance premium as a function of the own risk

Another calculation regarding insurance is the calculation of the premium as a function of the own risk. With an own risk R and S sick days, an insured employer pays the wages of the minimum of R and S sick days, and an uninsured employer pays the wages of S sick days. The higher the own risk, the lower the premium is. Since light accidents occur more frequently than severe accidents, the premium decreases at a diminishing rate. Therefore, we assume that the contribution c as a function of own risk R is given by

$$c = \alpha + \beta \cdot \frac{1}{R}$$

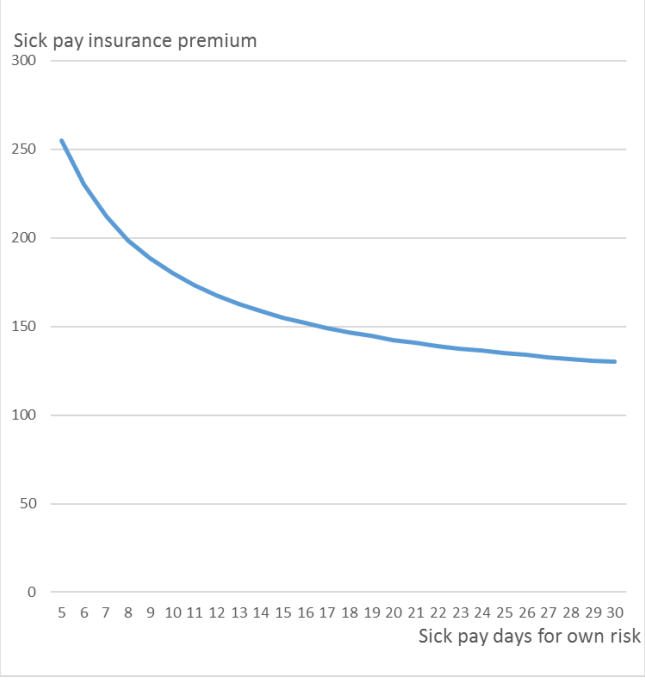
If an insurance provider gives to examples of premium rates c1 and c2 for levels of own risk R1 and R2, then the following system of equations can be solved for α and β:

$$\begin{cases} c_1 = \alpha + \beta \cdot \frac{1}{R_1} \\ c_2 = \alpha + \beta \cdot \frac{1}{R_2} \end{cases}$$

Which gives:

$$\begin{cases} \beta = \frac{(c_2 - c_1)}{1/R_2 - 1/R_1} \\ \alpha = c_1 - \beta \cdot \frac{1}{R_1} \end{cases}$$

For example, if a company insures sick days from day 10 for a monthly premium of EUR 180 per worker and insures them from day 30 for EUR 130 per month, then β = 750 and α = 105, and the premium as a function of waiting days is given by the figure below. The tool assumes that companies cannot insure sick leave without waiting days, because this would create a moral hazard problem. In that case, a company could ask a worker to call sick if there is no work that day to pass the wage bill on to the insurance provider.



Annex 3: Manual for updating the tool

The risk of accidents may change over time when new methodologies are introduced, for example prefab construction or the replacement of hand tools by machine tools. Wage rates, productivity and price levels may change over time, affecting costs and benefits. Pay regulations may change over time, and more company data may become available in the future. The main source for these data is Eurostat, and they are presented in "orange" sheets. This annex describes how to update these data.

As a general rule, cells with formulas are marked light blue. Non-shaded cells need to be updated manually:

1. Accident rates

The first sheet on accident rates "MS A-Rates Firm Size" presents accident rates in the construction sector by country and company size. However, from this sheet only the rates of fatal accidents and a classification of accident rates are used. For non-fatal accidents, the distribution by subsector was used as discussed in the next paragraph. One obtains the "social insurance" statistics by dividing the number of (fatal) accidents from the ESAW statistics (Eurostat reference number hsw_n2_05) by the number of employees according to the Structural Business Statistics (sbs_na_con_r2). Accident rates reported by workers are from hsw_ac5b, hsw_ac6b, hsw_ac7. One can update these from https://ec.europa.eu/eurostat/data/database, navigating from "Database by themes" as follows:

- Population and social conditions\Health\Health and Safety at Work (hsw);
- Industry, trade and services\Structural Business Statistics (sbs)\SBS – industry and construction.

The second sheet "MS A-Rates Subsectors" presents non-fatal accident rates by country, subsector and year, from hsw_n2_01. The most recent data were from 2017. The tool extrapolates the trends to 2018 in columns AR-AU. For each country and subsector, an update requires (manually) checking the data for missing and extreme values – basically as jumps to the eye. Extreme values are marked in orange and are excluded from the trend extrapolation. For two countries, no meaningful trend extrapolation was possible and the tool presents the average accident rates across all years 2008-2017. Columns AW-BD include some statistics from national sources in the hope to find data on all accidents (not only those with 4 or more sick days). However, for most countries the "social insurance" data are similar (but sometimes more detailed) to those in the ESAW statistics.

The third sheet "MS A-Rates Combined" calculates accident rates by country and subsector. Most calculations are automatic, however the sorting of accident rates by country for each subsector (columns H-J) needs to be done manually for a hardcopy of the columns D-F. This sheet also presents the proportions of workers that report occupational diseases (hsw_pb6a) in columns X-Y.

For the fourth sheet "EWCS output" one needs to apply for the EWCS microdata at the UK data service.[74] The sheet presents data on occupational diseases by subsector with the relevant

[74] https://www.eurofound.europa.eu/surveys/about-eurofound-surveys/data-availability#datasets

question numbers. The sample sizes for the construction sector are not sufficiently high to calculate data per country, as is evident from the sample sizes ("N") reported in this sheet.

The fifth sheet "A-Rates by Risk" presents the ESAW accident rates by subsector and risk category (hsw_aw_co2 and hsw_aw_de2). These data are not available per country. The accident rates from the ESAW statistics are combined with more granular data from a Dutch study (columns C-M in the sheet "Accident Rates", this is not annually available data) in rows 27 and below. In addition, the sheet "A-Rates by Risk" presents estimated rates at which new occupational diseases are developed in columns O-P, from various one-off sources.

The sixth sheet "A-Rates Countries by Risk" combines the data from the preceding sheets in a fully automated way to produce:

- Accident rates by country, subsector and risk;
- Rates of new occupational diseases by country, subsector and risk.

From this sheet, the sheet "Accident Rates" takes the relevant rates per risk in columns O-X, depending on the country and subsector selected by the user.

2. Unit costs of labour and services

The first sheet on costs "MS Unit Costs" summarizes the exchange rates, price levels and labour cost rates across the EU:

- Column B: exchange rates (Eurostat reference code: teimf200);
- Column Q-V: purchasing power parities (code prc_pp_ind).

These can be found by navigating as follows:

- Tables by themes\Economy and Finance\Exchange rates (t_ert);
- Database by themes\Economy and Finance\Prices (prc)\Purchasing power parities (prc_ppp).

Columns C-E automatically calculates the purchasing power parities compared to the reference country – the Netherlands (all prices looked up were prices in the Netherlands).

Columns H-N combine the data on labour costs from the subsequent sheet in one table by country, Subsector, Company Size and currency.

The second sheet "MS Costs Data" presents tables on labour costs according to different dimensions from the Eurostat labour costs and earnings surveys (reference codes: lc_ncost_r2 and earn_ses_hourly). One can find them from Databases by themes by navigating as follows:

- Population and social conditions\Labour market (labour)\Labour costs (lc);
- Population and social conditions\Labour market (labour)\Earnings (earn).

The raw data are in columns B-P for labour costs by country, subsector and company size respectively, and columns S-T present the gross wage rates in the construction sector and those of specifically craft workers. Columns X-AL combine these two data to calculate wage rates of craft workers in the construction sector. In these columns, missing data (especially for companies with fewer than 10 employees) are filled as well.

The third sheet "Eurostat Basic Data" presents the gross value added and the wage compensation of employees according to the National Accounts in columns C-H, and the earnings of not only craft workers but also managers and professionals in the construction sector, in columns O-V. One finds the national accounts data by navigating as follows:

- Economy and finance\National Accounts (ESA 2010) (na10)\Annual national accounts (nama10)\Detailed breakdowns of main GDP aggregates.

National accounts data are not equally up-to-date for all countries and notably delayed for the United Kingdom. Hence the sheet tabulates national accounts data for multiple years. Data from the most recent year is automatically selected in column L, where the productivity / labour cost mark-up ratio is calculated.

The wage mark-up for managers/professionals compared to craft workers is calculated in column Y. This columns uses earnings data for construction companies of all sizes. For companies with 10 or more employees, these are available for all Member States. The data including companies with fewer employees are available for some Member States, and estimated for other Member States in columns Z-AB.

3. Pay regulations

The sheet “Pay Regulations” contains data on pay regulations.

The data on sick pay regulations (column B-G) is available in MISSOC:

- https://www.missoc.org/missoc-database/comparative-tables/

Here, select “All EU countries” and category “III. Sickness – cash benefits”. This gives the most recent update of the sickness pay regulations. The financial framework uses some key parameters from this data source. These are State regulations that are the same for all sectors.

No such convenient EU data source exists for overtime pay (columns I-J). Moreover, in some Member States overtime pay regulations differ between sectors (and even subsectors). These regulations are in collective agreements in most Member States and in the labour code in some Member States. Data on these are collected from different sources for each Member States, as annotated in column K.

4. Company data

The researchers collected data on a range of topics that are relevant for the financial framework through case studies. The latest version of the financial framework (4 November 2011) uses data from 14 case studies, although not all companies were able to provide all data.

The first sheet on company data, “Case studies main data”, gives data on OSH officers, costs after an accident and indirect benefits.

All companies employ OSH officers, but in small companies they generally devote only part of their time on OSH. The main data taken from the case studies (in column B-D) are the number of craft workers, the number of OSH officers and the full-time equivalent factor (1 = full-time, less than 1 = part-time). Column E uses these data to calculate an OSH FTE/employee ratio. The tool calculates the EU-average that is used in the financial framework in row 3.

Among the costs after an accident (column G-L), those on administrative fines were assessed to be too unreliable for use in the framework, given the three responses of EUR 350; EUR 10,000; and EUR 125,000 respectively.

Among the indirect benefits (column N-Q), some extremely high values for some countries are marked orange and not used for the EU average.

The second sheet “Case studies equipment prices” presents reported prices of safety equipment for general/specialised construction and for civil engineering respectively. The costs of a safety helmet are used for two risks: “Falling objects” and “Pinching, Hitting by shot away objects” (columns I, K, Z and AB respectively).

The third sheet “Case study effects of measures” tabulates the percentages by which construction companies estimate that measures reduce the accident rate. For example, a reduction from 20% to 12% is a reduction by 40%. Two extreme values are marked orange and not used for the EU average.

Annex 4: Case studies

1 Austria – PORR AG

1.1 Company profile

Company profile		
Company name:		PORR AG
Company size (Number of employees):		About 19,000 in total
Currency		Euro
Type of employees		All kinds
Type of work		All kinds
Member State of establishment:		Austria
Operation in other EU MS:		Various EU countries
Number of dedicated OSH Officers		22 officers, full time
Estimated annual expenditure on OSH		Undisclosed
Estimated time since last …	… major accident	1,5 days
	… minor accident	1 day
	… near miss incident[75]	Daily

Construction sub-sector	Tick applicable boxes
F41.2 – Construction of residential and non-residential buildings	☒
F42.1 – Construction of roads and railways	☒
F42.2 – Construction of utility projects	☒
F42.9 – Construction of other civil engineering projects	☒
F43.1 – Demolition and site preparation	☒
F43.2 – Electrical, plumbing and other construction installation activities	☒
F43.3 – Building completion and finishing	☒

1.2 Background information

The company is a large contractor in Austria that covers all aspect of construction. They take part actively in occupational health and safety (OSH) initiatives and are well aware of the many risks in the sector. On average, 1 accident happens every day, however this includes also minor injuries such as cuts. These seem to be very high numbers, but this is also due to the size of the company. Overall the company is seen as a forerunner when it comes to OSH. The accident statistic is evaluated every quarter. Important to note is also that the definition of accidents varies, the company has the SCC certificate, which dictates that every accident that resulted into one absent day (not including the day of the incident) of the worker needs to be reported.

Outline of company OSH policy

The company's main activity in OSH is training, therefore the quality of instructions is important, but also to have focus areas and discuss accidents. It is also important to have the right culture at work. One tries to instruct employees on safety, however some employees seem to ignore instructions

[75] Near miss: an incident that could have resulted in an injury or illness to people, danger to health, and / or damage to property or the environment.

and tend to stick to old behaviours. Therefore, initiatives changing the workplace culture are strongly beneficial. Moreover, the company is improving its reporting of near miss incidents and aims to double the reported incidents. Unsafe situations or handling of situations can cause accidents, therefore the company collects these and summarises them under causes of hazards.

There would be some benefit in not only penalising bad OSH performance but also rewarding good OSH performance. Such incentives could be simply praising good employees in regard to OSH implementation. The company is currently trying to improve this approach and have higher management recognise valuable OSH efforts to elevate the topic among employees. On the other hand, incentives should also recognise that OSH infractions are often caused by employees on the ground, but consequences (besides the victim's injuries) are only felt at management level and covered by the company's accident insurance. The absolute coverage incites a certain moral hazard and does not properly penalise bad behaviour.

When asking the interviewee about other important aspects to improve OSH performance in the sector, it was mentioned that it starts already with the education of children. Education in schools should consider teaching awareness of safety and health issues. If we teach already the right behaviour in schools, then there is less need for awareness training and such later on.

Motives for OSH prevention

The most important motives for the company are:

- *Safety of workers*. Since there are no qualified stand-by employees and accidents traumatise the colleagues of victims, every accident and the absenteeism it causes is a huge problem for the company;
- *Company's reputation*. Often, accidents are also covered in media and they can gravely hurt the reputation of a company, especially one that is well-known;
- *Costs related to accidents*. Since these can be very high depending on the area with a loss of € 50 per hour for some specialists.

Outline of risks

Due to the company's size one cannot generalise risks, since it depends on the specific sector. In building construction, the main risk is falling, in earthworks, road construction and civil engineering it is the heavy machinery that poses a risk to workers. Industrial construction, especially in the chemical industries, is also very risky as there are many pipes and cables that if hit by machinery might create a dangerous accident. The latter is more of an external risk, since construction companies do not always know what is in all the pipes and also sometimes where they are exactly located. Moreover, many risks relate also to the numerous companies that work on one site. If one subcontractor makes a mistake, it might endanger everyone on the site. Normally, risks that relate to all companies are discussed together and everyone is informed about them (e.g. construction site traffic, demarcations), while risks related only to specific work are the responsibility of the company doing that work and it thereby has to instruct their workers properly.

Finally, one aspect that often gets neglected is the site preparation. Doing proper preparation has significant added-value in terms of not only OSH but also in economic terms. Deliberating beforehand about which materials, which work processes, which machines might be needed allows to find the best possible way to do a construction project and thereby also to prepare the right trainings and OSH instructions for workers on the project. This includes issues such as traffic routes on the site, interim storage places or management of trainees. Good planning should not be neglected.

In general, the most important OSH issue for the company is the awareness of their workers. Reports of hazards and dangerous situations come only if employees are aware of the risks. The company aims to achieve this via trainings, information materials, supervision and inspections. However, overall there is need for a change in work culture: if a line or site manager is not interested in OSH, then also employees will not care much about it.

1.3 OSH Initiative(s) profile

Awareness and use of sector initiatives regarding prevention measures on OSH

There are various sector initiatives, for example, EU-OSHA has its 2018-19 campaign titled "Healthy Workplaces Manage Dangerous Substances"[76]. The Austrian accident insurance (AUVA) has also various campaigns, such as "Hände gut, alles gut" (against hand injuries)[77], "!GIB ACHT - BABA UND FALL NET" (against fall injuries)[78] and the golden Securitas[79]. The Austrian labour inspectorates have also every year a focus area[80], this year it is scaffolding, however these are of less interest to the company. Finally, there are also the golden rules by the International Social Security Association (ISSA).

The company took part in EU-OSHA's campaign "Healthy Workplaces Manage Dangerous Substances". Indirectly, the company participates also in the Vison Zero campaign on the golden rules for zero accidents and healthy work, which has been developed by ISSA. This vision provides seven rules such as take leadership, identify hazards and invest in people with checklists for managers. The company implements this by asking their departments to have focus areas in training and instructions along these rules. The base concept is the same and it is up to the site manager which focus they choose. The company has also the SCC certificate and most other relevant safety and health certificates in Europe.

Initiative 1 profile	
Initiative name:	Healthy Workplaces Manage Dangerous Substances
Owner of initiative	EU-OSHA
Type of initiative:	Europe-wide
Risk(s) addressed:	Dangerous substances
Type(s) of intervention	Raise awareness, promote risk assessment, target workers
When was initiative implemented (at company)	2018 – 2019 campaign
Cost elements of the measure:	No particular cost in time as information needs only to be downloaded and distributed) Indirect costs of attending events
Funding or support received from initiative	Yes, free information material

76 https://osha.europa.eu/en/healthy-workplaces-campaigns/dangerous-substances-18-19
77 www.auva.at/cdscontent/?contentid=10007.730499&viewmode=content
78 www.auva.at/cdscontent/?contentid=10007.671149&viewmode=content
79 www.auva.at/cdscontent/?contentid=10007.671156&portal=auvaportal&viewmode=content&pk_campaign=goldenesecuritas
80 www.arbeitsinspektion.gv.at/inspektorat/Uebergreifende_Themen/Schwerpunkte_der_Arbeitsinspektion/;jsessionid=1C491E2C99557E1F58BE8B103566602A.bmsk

Initiative 2 profile	
Initiative name:	Vison Zero
Owner of initiative	ISSA – International Social Security Association
Type of initiative:	International
Risk(s) addressed:	Lack of awareness and safety culture
Type(s) of intervention	Awareness rising – commitments from company to adhere to vison zero accidents
When was initiative implemented (at company)	Permanent
Cost elements of the measure:	No direct cost of the campaign itself
Funding or support received from initiative	No

Other measures

The company has also a work accident insurance with AUVA which covers costs of accidents and mitigates the financial impact of them. No numbers were shared on the costs.

1.4 Observed impacts of the measures

In terms of benefits, these initiatives definitely save costs for the company. In the last 5 years, the company reduced its accidents by 30%. Considering that every lost hour in Europe costs the company on average € 35, this generates big savings. Before the reduced accidents numbers, the company had € 300 million in downtime costs. Considering an average profit margin of 1-2% in the construction sector, these accidents are a considerable risk and avoiding them save many costs. Costs in general depend though on the type of employee. If a specialist, that is required for very specific work, has an accident and cannot come to work, then this is a huge issue for the company, because it will be difficult to find someone with the same skills on a short notice. Sometimes, this means the construction site is standing still or the construction site manager has to pick up the victim's work, which means he has to neglect his regular work. However, if it is a regular construction worker then it is easier to find a substitute during the worker's sick leave. Therefore, one has to say that range of costs varies to a large degree depending on the degree of specialisation of the affected worker.

In addition, the company has also experienced major efficiency gains from improving OSH standards and has been awarded projects due to its safety performance (recently two projects of a combined value of EUR 30 million were won).

Costs depend on the location. However, for instructions and training a construction site has to be inactive for two hours. Over a year about 5 – 10% of productivity is spent on trainings and instructions (this includes instructions/trainings after incidents and stopping work due to critical situations). The inspections by safety personnel are not as expensive considering that there are 22 OSH officers compared to close to 20 000 employees that need training (70% of employees work on construction sites). Finally, higher management has to do inspections as well from time to time, which is also not very cheap considering their salaries.

1.5 Costs and benefits identified in financial framework

Undisclosed information.

2 Bulgaria - GP Group JSC

2.1 Company profile

Company profile		
Company name:		GP Group JSC
Company size (Number of employees):		595 employees total, as to August 2019
Currency		BGN
Type of employees		. The company employs all types of workers relevant to construction works, e.g. construction workers, crane operators, plumbers, electricians.
Type of work		The company works as a main contractor and subcontractor, but mostly works as main contractor.
Member State of establishment:		Bulgaria
Operation in other EU MS:		No (there is a construction project in Macedonia)
Dedicated OSH Officer		Yes, 10 officers, full time
Estimated annual expenditure on OSH		Undisclosed
Estimated time since last …	… major accident	No response[81]
	… minor accident	
	… near miss incident	

Construction sub-sector	Tick applicable boxes
F41.2 – Construction of residential and non-residential buildings	☒
F42.1 – Construction of roads and railways	☒
F42.2 – Construction of utility projects	☒
F42.9 – Construction of other civil engineering projects	☒
F43.1 – Demolition and site preparation	☒
F43.2 – Electrical, plumbing and other construction installation activities	☒
F43.3 – Building completion and finishing	☒

The company works in all of the above sectors, but most of its projects are in sub-sectors "F41.2 – Construction of residential and non-residential buildings" and "F42.1 – Construction of roads and railways". It also does installations and building completion and finishing.

2.2 Background information

Outline of company OSH policy

GP Group JSC's OSH policy aims at compliance with OSH legislation in the field of construction, improving safety and working conditions, and avoiding risks and accidents. There are OSH officers; workers attend safety trainings and instructions. It employees attend trainings organised by the Bulgarian Construction Chamber. Also, the Executive Agency "General Labour Inspectorate" also

[81] An answer to this question could not be given since construction companies are not obliged to collect and maintain such statistics. Furthermore, it is not clear and legislation does not say what is meant by "major accident" and "minor accident". Bulgarian legislation only refers to "accidents" and does not distinguish them to major or minor.

have training initiatives but they are not as frequent as those of the Construction Chamber since most of them are organised within projects.

Motives for OSH prevention

Although there are many motives for OSH, the top three motives of GP Group JSC for OSH prevention are:

- Legal compliance;
- Safety of workers;
- Company reputation.

Outline of risks

The major risks that the company faces is when workers do not use personal safety equipment. Other risks relate to falling from height, burying in trenches, injuries from electricity, tripping or slipping, and jabbing. The latest incident was in 2018 - a worker, on his way home (from work), was hit by a car on a pedestrian crossing. According to Bulgarian legislation, any accident, happened during employee's way to or back to work, is considered a work accident.

It should be noted here that the company did not have any accidents related to the aforementioned risks so far, and for this reason cannot provide statistics on them. With regard to the mentioned accident, the company did not incur any costs. All expenses related to the medical services received by the worker who was hit by the car, were covered by its Health Insurance.

2.3 OSH Initiative(s) profile

Awareness and use of sector initiatives regarding prevention measures on OSH

Initiative profile	
Initiative name:	Trainings organised by "Construction Qualification" JSC. (A company owned by the Bulgarian Construction Chamber)
Owner of initiative	"Construction Qualification" JSC.
Type of initiative:	Sector-wide trainings
Risk(s) addressed:	Various risks, based on the type of construction works
Type(s) of intervention	Training, guidance material, knowledge sharing
When was initiative implemented (at company)	The initiative is permanent
Cost elements of the measure:	Estimated number of work-days to implement: 32 hours for training preparation and delivery per employee Estimated amount of costs in € (and local currency): Around 8500 BGN (€ 4346) for training preparation and delivery in 2018 or approximately 15 BGN (€ 7) per employee.

Other measures

All construction companies should have work accident insurance. GP Group JSC also provides additional medical insurance to its workers and a multi-sport card (i.e. a subscription to a sports hall).

2.4 Observed impacts of the measures

Regarding the impacts of the measures, the company noted that it saved costs but could not quantify the amount. It was agreed that OSH measures had positive impacts on efficiency, resulted into more projects or less idle time between projects due to quality work, and reduced the hiring costs. The benefit of lower absenteeism due to personal safety concerns was not observed.

2.5 Costs and benefits identified in financial framework

Undisclosed information.

3 Bulgaria – Parsec Group Ltd.

3.1 Company profile

Company profile		
Company name:		Parsec Group Ltd.
Company size (Number of employees):		80
Currency		BGN
Type of employees		Administrative staff, technical staff, both specialised and general workers.
Type of work		The company regularly works as a main contractor
Member State of establishment:		Bulgaria
Operation in other EU MS:		No
Dedicated OSH Officer		Yes, fulltime
Estimated annual expenditure on OSH		
Estimated time since last …	… major accident	*None (major, minor accidents and near miss incident) have happened in the company according to the interviewee.*
	… minor accident	
	… near miss incident	

Construction sub-sector	Tick applicable boxes
F41.2 – Construction of residential and non-residential buildings	☒
F42.1 – Construction of roads and railways	☒
F42.2 – Construction of utility projects	☐
F42.9 – Construction of other civil engineering projects	☒
F43.1 – Demolition and site preparation	☐
F43.2 – Electrical, plumbing and other construction installation activities	☐
F43.3 – Building completion and finishing	☒

3.2 Background information

Outline of company OSH policy

The company's OSH policy aims at meeting the Occupational Health and Safety Act requirements, avoiding occupational risks and accidents, and improving working conditions. There are not quantified objectives and target or targets that should be met within a specified time. OSH policy is integrated within the overall management of the company, and a Safety officer is responsible for its implementation, including preventive measures such as trainings.

Motives for OSH prevention

Although there are many motives for OSH, the top three motives of Parsec Group Ltd. for OSH prevention are:

- Legal compliance;
- Safety of workers;
- Quality of work.

Outline of risks

The company performs construction works and specializes in construction of residential and non-residential buildings, roads and railways, as well as other civil engineering projects. It also does

building completion and finishing works. The most relevant and important OSH risks for its workers are:

- Falling from a ladder, roof, platform or floor;
- Hitting workers by falling objects;
- Other risks (e.g. injuries) are also relevant and could happen but their nature and probability for occurrence depend on the construction object and the type of works. So far, the company did not register work-related accidents.

3.3 OSH Initiative(s) profile

Awareness and use of sector initiatives regarding prevention measures on OSH

Trainings are the most common and popular OSH prevention measure in the construction sector in Bulgaria. The company took part in trainings for complying with the Occupational Health and Safety Act requirements and for updating knowledge and skills of construction engineers, of project managers and of other construction workers.

Initiative profile	
Initiative name:	Trainings organised by "Construction Qualification" JSC. (A company of the Bulgarian Construction Chamber)
Owner of initiative	"Construction Qualification" JSC.
Type of initiative:	Sector-wide trainings
Risk(s) addressed:	Trainings address different risks, based on the type of construction works
Type(s) of intervention	Trainings, one-day seminars, guidance material, knowledge sharing
When was initiative implemented (at company)	The initiative is permanent
Cost elements of the measure:	• Estimated number of work-days to implement: 32 hours for training preparation and delivery per employee; • Estimated amount of costs is around 8,500 BGN (€ 4,346) for training preparation and delivery in 2018.
Funding or support received from initiative	Non applicable

Other measures

Pursuant to the applicable legislation, each construction company, including Parsec Group, should insure its workers against occurrence of occupational health and safety risks. Insurance premium depends on each worker's salary and on the amount which will be paid in case of accident or of occupational disease. Work insurance premium is calculated on the basis of the worker's annual gross salary for a period of at least 7 years, taking into account the legally defined work accident coefficient.

For instance, a company employing 60 construction workers (out of 80 persons overall staff) with a monthly remuneration equal to the average for the construction sector in 2018 (according to the

National Statistical Institute's data), i.e. 927.00 BGN (€ 474.00), would spend at least 253.07 BGN (€ 129.39) a month, or 3036.85 BGN (€ 1552.72) a year for insurance premiums.[82]

3.4 Observed impacts of the measures

A direct outcome from participation in OSH related trainings is workers' improved knowledge about relevant risks and their prevention about legal requirements and the most common accident factors. However, outcomes could not be quantified because there is not a methodology or an instrument setting out steps for measuring the savings made or the benefits resulting from OSH investments.

3.5 Costs and benefits identified in financial framework

Undisclosed information.

[82] Salary 927.00 BGN * 84 months (7 years) = 77 868.00 BGN * 0.065% average work accident coefficient = 50.61 BGN premium per person per year; 50.61 BGN * 60 workers = 3036.85 BGN for all construction staff.

4 Germany – Mainka Bau GmbH & Co. KG

4.1 Company profile

Company profile		
Company name:		Mainka Bau GmbH & Co. KG
Company size (Number of employees):		> 600 (75% of which are construction workers)
Currency		Euro
Type of employees		Construction workers, engineers, business personnel, as well as managing personnel on construction sites)
Type of work		Main contractor
Member State of establishment:		Germany
Operation in other EU MS:		Netherlands, Belgium
Dedicated OSH Officer		9 Full time OSH officers (+ over 20 part-time workers commissioned for construction sites). In total, about 1.5% of FTE is devoted to OSH.
Estimated annual expenditure on OSH		Undisclosed
Estimated time since last …	… major accident	Over 1 year
	… minor accident	1 month
	… near miss incident	Daily

Construction sub-sector	Tick applicable boxes
F41.2 – Construction of residential and non-residential buildings	☒
F42.1 – Construction of roads and railways	☒
F42.2 – Construction of utility projects	☒
F42.9 – Construction of other civil engineering projects	☒
F43.1 – Demolition and site preparation	☐
F43.2 – Electrical, plumbing and other construction installation activities	☐
F43.3 – Building completion and finishing	☐

4.2 Background information

Mainka Bau GmbH & Co. KG based in Lingen, Germany that works as main contractor on many different construction sites with a focus on utility projects and construction works for factories such as chemical plants. The company takes occupational safety and health (OSH) as one of its core priorities as highlighted by its slogan “Wir bauen sicher oder gar nicht” (We build safe or not at all). This is also echoed by the day counter at the reception in their headquarters, which counts the days since the last major accident (lost time incident). At the time of the interview the counter was at 594 days.

Outline of company OSH policy

The company has the goal to improve reporting of incidents at their sites in order to learn from them. Therefore, Mainka facilitates the reporting of incidents through Continuous Improvement Process (CIP) cards. The cards are filled in by construction site managers for every major and minor accident as well as for every near-miss incident. These cards are submitted via the intranet and are collected centrally at the Headquarter in Lingen, which then are reviewed by OSH officers

and discussed in the weekly construction manager meetings. If there are lessons to be learnt then this information will flow into the monthly instructions at construction sites. The company Mainka is aiming to improve the safety and reporting culture. In 2013, OSH officers received 185 reports. Since then the company simplified the processes and put emphasis on the importance of reporting and putting the support of the managing board behind it. In 2018, Mainka had 976 reports. As a next step the company plans to make use of digitalisation and develop an app to further facilitate reporting.

Next to the CIP cards, Mainka makes also use of monthly instruction session at construction sites. These come from the SCC certificate's ruleset, which the company needs as much of their work is at petrochemical facilities, which require the certificate for construction works. The company however decided to apply the CC rules to all their construction sites independently from it being required.

Motives for OSH prevention

The most important motives for Mainka are:

- *Company reputation*. The company can lift itself in the market and among competitors by having a unique characteristic with the strong focus on safety and characterised by the slogan: We build safe or not at all. In fact, other entrepreneurs voiced some envy as they see it as a unique and great way to promote oneself and be visible among the many regular slogans on timely delivery of work or reasonable prices. The next most important motive is probably the;
- *Certification*, which is the external pressure coming from clients such as refineries that demand that Mainka has the Safety Certificate Contractors (SCC) certificate[83]. At one point the company decided instead of having different standards for different construction sites to use this higher safety standard independently if it's required;
- *Worker loyalty* is also an important factor. Workers appreciate the safety focus. One can see it at how long people are working at Mainka with some celebrating their 35-40 year company anniversary showing consistency and reliability.

Outline of risks

There are no clear cut risks, Mainka does traditional construction work and is not focused on a specific field. Therefore it is important to differentiate between civil engineering, where one works with a lot of machines and equipment, where the big risks are and building constructions where falling from heights is the main problem. In addition, there are factors that one cannot influence, such as working environments where a plant is still operational. For example, when workers work in areas with pipes and conductions, where they do not know what is in them and might get to close with their machinery. It is somewhat always a special situation when on works inside an existing plant such as a refinery and chemical plants. Otherwise we have the classical risks as any other construction company.

There is an opportunity for building logbooks and BIM tools in reducing the latter risk by monitoring and providing reliant data on buildings. In this regard, Mainka does also facility management in buildings and especially industrial plants, where the company needs provide maintenance services. There workers have to remove often parts and need to know what is in or behind them (e.g. asbestos) in order not to endanger themselves. Even in large companies and in civil engineering work, there are pipes and wirings that are not known of and which then get hit by workers. In these cases the wirings are often not used anymore, but still this could be dangerous.

[83] For more information see: https://www.tuv.com/netherlands/en/scc-scc-sccp-scp-occupational-safety-certification.html

4.3 OSH Initiative(s) profile

Awareness and use of sector initiatives regarding prevention measures on OSH

Arguably, Germany (especially compared to Scandinavian countries) is not leading when it comes to OSH. There is still much room for improvement and the issue should be raised more often in Germany. There are some notable initiatives though:

From the accident insurance, BG BAU (statutory accident insurance):

- Build on Safety, build on yourself (Bau auf Sicherheit, bau auf dich), current BG BAU campaign with slogans on doing things a thousand times and then once an accident occurs (because one gets careless) – The program aims at behavioral changes of employees to raise awareness and make safety more important;
- Three years ago, there was the initiative “Risiko raus” (Risks out). This was about employees not being hit by Machines and are more visible in civil engineering (Tiefbau);
- Sehen und Verstehen (See and understand): Is an initiative that Mainka started recently to use more often in their instructions and trainings, because the comics are good at creating understanding among workers about dangerous situations. Considering that there are also many foreign sub-contractors or employees on construction sites it is a challenge to create a common understanding. One can work with an interpreter, but it is always easier and better to work with these pictures/comics.

Deutscher Jugendarbeitsschutzpreis (German Youth-Occupational Safety Prize): In 2016 and 2018, Mainka took part in the German youth occupational safety prize and won in both cases. This competition occurs every two years. This year the company takes also part for the first time in the “Deutscher Arbeitschutzpreis” (German Occupational Safety Prize) and is in the category *strategy* in the final round. Finally, Mainka has also the SCC certificate and is aware of the German Statutory Accident insurance’s AMS BAU certificate[84].

Initiative 1 profile	
Initiative name:	Sehen und Verstehen (See and understand)
Owner of initiative	BG BAU
Type of initiative:	Nation-wide and sector-wide
Risk(s) addressed:	Communication
Type(s) of intervention	guidance material, knowledge sharing in form of comics and web app
When was initiative implemented (at company)	Permanent
Cost elements of the measure:	No particular cost in time as information needs only to be downloaded and distributed (part of monthly instruction meetings) Free for members of accident insurance
Funding or support received from initiative	Yes free information material

[84] For more information see: https://www.bgbau.de/service/angebote/ams-bau-arbeitsschutzmanagementsystem/the-occupational-health-and-safety-management-system-ams-bau/

Initiative 2 profile	
Initiative name:	Deutschen Jugendarbeitsschutzpreis
Owner of initiative	Fachvereinigung Arbeitssicherheit e.V. (FASI)
Type of initiative:	Nation-wide
Risk(s) addressed:	Lack of awareness – and any risk as youth submit innovative safety ideas that get rewarded
Type(s) of intervention	Awareness rising
When was initiative implemented (at company)	Since 2004 every two years
Cost elements of the measure:	No direct cost, only indirect of younger workers spending on coming up with an idea, preparing it and submitting it for the prize
Funding or support received from initiative	No

Other measures

Mainka also has a work accident insurance to cover accident and recovery costs. In addition the company also pays half for a fitness subscription (Qualitrain) for employees for training to counter the one-sided strain on the body from the work. Finally, Mainka also provides a shopping card that employees receive who do not get ill and live healthy receive (€ 25 per month). In terms of costs, the Qualitrain subscription costs the company about € 20 per worker and the shopping card up to € 300 per worker if they do not get ill. There are no estimates for savings achieved. Only for the accident insurance, for which the company saved € 100,000 from the last accident.

4.4 Observed impacts of the measures

In terms of benefits, the interviewee stated that saving costs is the wrong concept. These OSH measures do not directly save any costs (beyond avoided accidents, which one cannot measure). However, the company noted that in some cases they win projects despite not being the cheapest competitor. It does not happen very often, but sometimes safety competences get rewarded by clients via awarding projects and it seems that Mainka has gotten a good reputation in this regard. There is no specific trend towards safety becoming more important for clients, but one of Mainka's main clients, the chemical and petrochemical industries, were always leading regarding safety and security.

Fewer accidents, means fewer costs from reduced down-time of injured employees and insurance premiums that do not rise (which could rise if there are too many accidents). Regarding the latter, Mainka would like to see good OSH performance (with no or only a few accidents) to be rewarded by the accident insurances, which is currently not the case. In addition, the company also experienced reduced hiring costs due to less staff turnover. Mainka has about 2000 applications a year (very good amount for a small company). The company has however not experienced increased efficiency from higher OSH standards. Contrary, the interviewee argued that high OSH standards cost time and thereby reduce efficiency.

Costs are difficult to judge, but it the most expensive is not the construction sites inspections, since these have to be done anyway. However, the work equipment that needs to be provided and checked every time costs a lot of money. This is not taken into consideration by individual construction sites though, since these are provided by and stored at the headquarter. Overall, a luxury at Mainka is that it runs its own OSH department (QHSE department). The department has quite some high costs and is probably the main cost, considering that there are nine full-time employees, who work on their individual projects or sites. In contrast, probably in 95% of

construction companies in Germany an OSH officer is a side job done by employees who might also cover other tasks as a main job.

Overall, the company estimates the following reductions in accident probabilities per OSH measures.

Measures	Measure taken? (Yes or No)	Estimated value of reduction in accident probabilities
Procedures, handbooks, repair schemes	***Yes**, it helps to think and plan ahead for these dangerous situations and have procedures ready.*	31%
Adequate size and sufficient time of crew	***Yes**, pressure due to low staffing or time can cause accidents*	15%
Training in safety competences (1 day every year)	***Yes**, since technology and equipment are there but the missing factor where there is room to improve is the human one*	70%
Training in culture (motivation, alertness, priorities) - 1 day every 5 years	***Yes**, changing company culture is important in reducing accidents*	70%
One-of awareness / basic safety training (1 day)	***Yes**, but one-of trainings effect disappears quickly.*	10%
Work communication / cooperation (10 hours per worker every year)	***Yes**, at project kick-off but also Mainka started testing a new concept "Mainka Steuerungstafel", which is a table placed direct at the site, where manager and Polierer can look together with the employee what needs to be done per day and here communication is very important (daily 5 min).*	60-70%
Safety material / equipment	***Yes***	50%
Ergonomics (one-off check for posture during work)	***No** separate training*	10%
Medical check-ups and testing every 5 years	***Yes**, good to have but effect is low*	5%
OSH safety coordinator(s)	***Yes** and could be higher than 60%, but only if having these does not mean other management and workers forget about safety because it is not their concern anymore. Important part of this role is also communication and showing that OSH is a task for everyone.*	>60%

4.5 Costs and benefits identified in financial framework

Cost element		Costs
Cost element 1	Safety goggles + gloves combined	15 EUR; However they do not work as electricians and therefore only need simple leather gloves and not high voltage equipment.
Cost element 2	2 arm protectors	138 EUR; Work clothing that covers many requirements (e.g. anti-flammable, anti-static)

Cost element 3	Platform ladders	1200 EUR
Cost element 4	Safety helmet	5 - 15 EUR (the latter for a newer model), good for 5 years
Cost element 5	Safety knife	10 EUR
Cost element 6	Camera monitoring system for machinery	1000 EUR per machinery
Cost element 7	Lifting bands/ribbons, etc.	10 - 30 EUR (Depending on weight); Two strain chain (2 Strangkette) 90 EUR
Cost element 8	Steel-shod safety shoes	40 EUR (New show type 70 EUR)
Cost element 9	Earplugs	125 EUR (fitted/personalised, filters high and low pitch noises); 15 - 20 EUR Regular ones

5 Denmark – Christiansen & Essenbæk

5.1 Company profile

Company profile		
Company name:		Christiansen & Essenbæk A/S
Company size (Number of employees):		180
Currency		Euro
Type of employees		150 full-time and 30 part-time permanent employees covering a range of professional, surveying, and on-site civil engineering services. About two thirds of the company are site workers.
Type of work		Main contractor or subcontractor on a range of types of civil engineering and construction works including renovation of existing concrete structures, building structure renovation, assessments of concrete structures, civil engineering works, laying concrete, epoxy injection, etc.
Member State of establishment:		Denmark
Operation in other EU MS:		No
Dedicated OSH Officer		Yes/Fulltime employee
Estimated annual expenditure on OSH		€ 150,000 per year approximately, not including insurance
Estimated time since last …	… major accident	3 years
	… minor accident	1 week
	… near miss incident	1 week

Construction sub-sector	Tick applicable boxes
F41.2 – Construction of residential and non-residential buildings	☒
F42.1 – Construction of roads and railways	☒
F42.2 – Construction of utility projects	☒
F42.9 – Construction of other civil engineering projects	☒
F43.1 – Demolition and site preparation	☐
F43.2 – Electrical, plumbing and other construction installation activities	☐
F43.3 – Building completion and finishing	☒

5.2 Background information

Christiansen & Essenbæk wants to be a company that takes OSH related issues seriously. Thus, the company focuses on complying with the Danish regulatory requirements in OSH. Christiansen & Essenbæk considers OSH to be a driver for setting high technical and professional standards, and thus is a competitive parameter. A focus on OSH helps the company to foresight and plan their processes and minimize work related accidents and reduce attrition related to mental and muscular-skeletal disorders.

Outline of company OSH policy

Christiansen & Essenbæk OSH goals and action plan are drawn up by the OSH organization and approved by the company's director. The OSH organization sets the company's work environment

goals and action plan. These are based – among other things – on mapping of occupational health problems and conditions, the results of safety surveys and internal audits, experiences of accidents and near miss incidents, as well as other experiences from the industry. The OSH objectives and action plans are set once a year at an OSH committee meeting and monitored on an ongoing basis. The management representative is responsible for defining and monitoring the goals and action plan.

The company has four focus areas. These are:

- *Sickness absence*. The goal of sick leave is 2 percent;
- *OSH inspection rounds*. The goal is 64 OSH inspection rounds per year. The company has put in more resources to check the construction sites for complying with OSH issues going beyond mere compliance, with the aim of linking safety to improvements in productivity;
- *Epoxy course*. 50 percent of total staff should take an epoxy course (i.e. how to properly inject epoxy when for example repairing concrete). The company continuously checks the number in the system to ensure that at least 50 percent take the course;
- *Accidents*. The goal is zero accidents each year. To ensure this all near miss incidents and accidents are analysed to find preventive solutions and avoid similar accidents in the future.

Motives for OSH prevention

Although there are many motives for OSH, the top 3 motives of Christiansen & Essenbæk for OSH prevention are:

- *Planning of work.* A focus on compliance with legal OSH requirements helps Christiansen & Essenbæk to streamline and standardise their workflows and processes. A continuous improvement of the work processes is achieved through a systematic, foresighted and thereby preventive work structure, targeted continuous use of risk assessment in order to identify hazards and procedural errors at an early stage and introduce corrective measures and in involving employees in order to utilise their experience to attain a fault-free work process;
- *Safety of workers*. A motivation to focus on OSH is the safety of works. It is a win-win situation for the workers and the company. The motivation, and thereby productivity, of the employees is encouraged by avoiding work-related health risks as well as high numbers of staff on sick leave;
- *Company reputation*. Not only is OSH good for the employees but is also good for business. A systematic approach to OSH helps demonstrate that Christiansen & Essenbæk is socially responsible, and protects and enhances brand image and brand value.

Outline of risks

The major risks that the company faces are:

- *Fall from heights*. Could be catastrophic with possible death. This could incur damages from third parties as well. These costs are covered by insurance products;
- *Slips and trips*. Usually the cost includes a few days off work or a change to different types of duties;
- *Lifting heavy and difficult to carry materials*. Manual handling of heavy difficult to carry materials is an activity that can cause injury. This results mainly in lower productivity for a few days;
- *Eye injuries.* Occurs sometimes and normally involves lower productivity and possibly time off work;
- *Poor management, poor working culture, lack of cooperation and communication*. This can lead to psychological problems and low motivation. Can increase sickness absence.

5.3 OSH Initiative(s) profile

Awareness and use of sector initiatives regarding prevention measures on OSH

Initiative 1 profile	
Initiative name:	Mandatory OSH course
Owner of initiative	The Danish Working Environment Authority/Social partners
Type of initiative:	Nation-wide
Risk(s) addressed:	All OSH issues
Type(s) of intervention	Training, guidance material, knowledge sharing
When was initiative implemented (at company)	1990 – permanent
Cost elements of the measure:	Three working days to attend (app. € 300) plus loss of earnings
Funding or support received from initiative	No

Initiative 2 profile	
Initiative name:	BAMBUS
Owner of initiative	Construction employer organisation
Type of initiative:	Sector-wide
Risk(s) addressed:	All OSH issues
Type(s) of intervention	Guidance material, knowledge sharing, consultancy, online tools, new equipment
When was initiative implemented (at company)	2008 – permanent
Cost elements of the measure:	There is some time spent on preparing for a scheduled visit, but the time spent depends on the situation and OSH problem. It is difficult to assess the costs of implementing the initiatives, since it depends on the nature of the OSH problem and the corresponding measures that the company needs to take. Typically, it can be half a day for the site manager plus implementing the recommendations.
Funding or support received from initiative	No
Extra information	The Safety and Health Preventive Service Bus for the Construction Sector Safety Observer app

Initiative 3 profile	
Initiative name:	Safety Observer App
Owner of initiative	The National Research Center for the Working Environment (NFA) in Denmark
Type of initiative:	Nationwide
Risk(s) addressed:	Physical OSH issues
Type(s) of intervention	Online tools
When was initiative implemented (at company)	2017 – permanent
Cost elements of the measure:	It's free but requires time inputting the data, normally about 15 to 30 minutes after monitoring sites.
Funding or support received from initiative	No
Extra information	It is a tool for examining safety conditions and safety behaviour in the workplace that helps companies to track progress and get an idea of the extent of the risks. Website: http://nfa.dk/safetyobserver

Other measures

There are other measures that the company employs to mitigate the financial impact of accidents without actually reducing the accident rate. These are:

- A health and safety management system;
- A full time OSH coordinator;
- Training course for new employees;
- Inspection rounds at the construction sites;
- Ongoing improvement of working systems on site;
- Private health insurance (employees get quicker treatment, which benefits the company);
- Work accident insurance.

The estimated costs and savings of these other measures combined is overall (including insurance) in the region of € 250k per year.

5.4 Observed impacts of the measures

In general, the OSH manager finds that communicating OSH measures in specific areas can help to strengthen the take up of OSH practices. For instance, if there is a company focus on handling materials, the awareness of using good lifting techniques and gloves increases. So in the company there is constantly a focus on communicating new OSH themes, and in this way raise the general OSH awareness.

The health and safety management system gives the company a full overview of the risks that the company faces. The system ensures that the company OSH procedures are complied with so that there is a continuous improvement of the working environment. The current version of the company OSH procedures is available electronically and relevant parts of the system are included in the staff folder, which is provided to all employees. Major changes in the system are adopted by the Working Environment Committee. The OSH manager has the power to make minor changes. Relevant occupational health and safety records such as accident assessments, safety surveys, internal audits, surveys, etc. kept for five years. All employees have access to the system. It is difficult to assess the saved costs and benefits from the system, but the company assesses that it is a valuable tool for avoiding future work-related accidents.

The inspection rounds to check if the construction sites comply with the OSH requirements are time consuming but they are useful in providing concrete advice to the workers on-site and in providing information back to the OSH coordinator. A security coordinator completes the inspection rounds, and the results are reviewed with the construction manager. It is the construction manager's responsibility to correct any errors / violations immediately or at a specified deadline. The construction manager is also responsible for the rounding schedule on site which is made available for all to access. The security coordinator also keeps a copy of all rounding forms presented on the upcoming safety committee meeting, where any long-term preventative action is decided.
The company focuses on training new employees to introduce them to the work culture and OSH rules. All new employees must attend training courses, where he/she goes through the key OSH topics. There is a follow up training within a few months. The OSH coordinator is responsible for registering the training courses that each employee has, and all employees have the opportunity to extract information from the database. The construction manager is responsible for ensuring that the employee is continuously instructed on safety and the working environment, in relation to daily work. He is also responsible for ensuring that only appropriately trained persons conduct tasks corresponding to their skills.

Overall, the saved costs and benefits are difficult to assess. However, the company has a solid reputation around safety, relatively low staff turnover, a low major accident rate, and generally good staff morale. Without the specific OSH focus at the company, it was felt that company would be exposed to more risks and associated costs.

5.5 Costs and benefits identified in financial framework

Cost element	**Costs**	
Cost per worker of investment in safety equipment		
Cost element 1	Safety googles	300 DKK (available to all site workers although all site workers will not be required to wear them – depends on the tasks)
Cost element 2	Disposable breathing masks	200 DKK (again available to all but will tend to be used only when there are risks due to dust)
Cost element 3	Steel shoe	800 DKK per workers
Cost element 4	Trolley for carrying materials	1250 DKK (not per worker but they are available on site)
Cost element 5	Ear plugs	200 DKK
Presenteeism		
	Slipping and tripping	0.5 month presenteeism
	Lifting, twisting, stepping	0.5 month presenteeism
	Poor management and communication	1 month presenteeism
Benefit element	**Benefits**	
Benefit element 1	Repeat sales with clients (reputational benefits)	A small percentage of the annual turnover is due to the good safety reputation
Benefit element 2	Reduced accidents	Difficult to quantify but the company has a strong safety culture and accident avoidance is a consequence of this
Benefit element 3	Reduced absenteeism	Over the years absenteeism has reduced by about 1 percent from 4 percent to approx. 3 percent. The company target is 2 percent.

6 Estonia – EstHus OÜ

6.1 Company profile

Company profile		
Company name:		EstHus OÜ
Company size (Number of employees):		16
Currency		Euro
Type of employees		Construction workers, construction carpenters
Type of work		Subcontractors
Member State of establishment:		Estonia
Operation in other EU MS:		Sweden, Finland (and also Norway)
Dedicated OSH Officer		Yes, part-time
Estimated annual expenditure on OSH		€ 2,000 (and local currency)
Estimated time since last …	… major accident	5 years
	… minor accident	6 months
	… near miss incident	1 month

Construction sub-sector	Tick applicable boxes
F41.2 – Construction of residential and non-residential buildings	☒
F42.1 – Construction of roads and railways	☐
F42.2 – Construction of utility projects	☐
F42.9 – Construction of other civil engineering projects	☐
F43.1 – Demolition and site preparation	☐
F43.2 – Electrical, plumbing and other construction installation activities	☐
F43.3 – Building completion and finishing	☒

6.2 Background information

Outline of company OSH policy

As with any similar company, preventing and minimizing the effect of work accidents is a priority for the company but no official quantitative targets have been set. However, if there is an incident in the work place, there is always a mandatory meeting after the accident where it is discussed how it could be prevented and what were the mistakes both the employer and employee made. There are also plans to start summarizing all work safety related information (e.g. accidents, trainings, prevention actions, costs associated, etc.) at the end of each year.

All staff receive training both when they start the job and also regularly afterwards. The interviewee estimates that costs of OSH measures do not exceed a few thousand euros a year (more precise estimations below). The company has two unofficial part-time safety officers who update the safety manuals and deal with general OSH issues in the workplace (these tasks are in the purview of the production manager and foreman).

Motives for OSH prevention

The top-5 motives to participate in OSH prevention*:

- Legal compliance;
- Safety of workers;
- Worker loyalty;

- Company reputation;
- Quality of work.

*The interviewee was unable to choose only three, they chose five. The first three are of the most important.

Outline of risks

EstHus is an Estonian manufacturer of prefabricated timber frame houses. The company fabricates the house elements in its factory, transports it to location and assembles it there.

The main risks associated with the job fall are:

- Recklessness and poor handling of tools (e.g. disorderly work space, lack of foresight, poor planning of work and work stages, rushing, not reading the instruction manuals first) – these are the most common types of incidents that usually result in near misses or in rare cases, minor accidents (major accidents are very rare). On average, these occur every few months. In terms of estimated costs, the extra time spent due to incidents and increased workload on other employees are the largest resource consumers;
- Broken machinery and devices (e.g. technical malfunctions of any machinery) – while these occur rarely, they are one of the most expensive type of workplace accidents. It is estimated that replacing heavy machinery components or fixing them costs circa € 1,000.

6.3 OSH Initiative(s) profile

Awareness and use of sector initiatives regarding prevention measures on OSH

- https://www.napofilm.net/ - Napo is an original idea conceived by a small group of OSH communications professionals in response to the need for high quality information products to break down national boundaries and address the diverse cultures, languages and practical needs of people at work. They also have a YouTube channel;
- https://www.tooelu.ee/en - the working life portal that gathers all types of workplace related information;
- Personal information exchange with former colleagues – opportunities to swap experience and information are never passed down. According to interviewee, information on useful trainings, for example, is largely spread through word of mouth.

Initiative profile	
Initiative name:	Work safety and work environment regulations handbook (in-house manual)
Owner of initiative	EstHus OÜ
Type of initiative:	Private
Risk(s) addressed:	Overall company management and policies, a large number of safety manuals for various devices and machinery, a guide to using personal safety gear, safety information on various chemicals, etc.
Type(s) of intervention	Guidance material
When was initiative implemented (at company)	2013 – until (now)
Cost elements of the measure:	• Estimated number of work-days to implement: 7 days • Estimated amount of costs is € 500
Funding or support received from initiative	No

Other measures

Other measures include work trainings (i.e. specific trainings per field of operation, e.g. heavy machinery), regular health check-ups, first aid training and work insurance.
The costs of these are: insurance costs are unknown, health check-up costs € 75 per person, first aid training costs € 40 - € 50 per person and machinery trainings are normally free (as they organized by the machinery manufacturer). All in all, these costs are estimated to be around € 2,000 a year.

The main benefits and savings lie in prevention and in case of health check-ups, in disease diagnosis and treatment.

6.4 Observed impacts of the measures

While the qualitative effects are difficult to assess as the company does not have a high volume of work accidents, impacts have been noted. For example, one employee was for more than a year often on sick leave – the employee claimed to be fit and healthy but still continued to have health problems. However, during the regular mandatory health check-up with the occupational health doctor, the employee was diagnosed with various health problems and deemed unfit for the job. As such, the health check-up helped diagnose the employee and get them treatment while also freeing their position to be filled by another employee who is fit to work.

6.5 Costs and benefits identified in financial framework

The interviewee was unable to check if the costs and benefits are realistic as they are not knowledgeable about these aspects and their field of operation is much narrower than general construction. However, their response to the framework was positive and they felt this type of information may prove useful in some contexts.

7 Finland – Ab Vasa Byggnadsreparation

7.1 Company profile

Company profile	
Company name:	Ab Vasa Byggnadsreparation - Vaasan Rakennuskorjaus Oy
Company size (Number of employees):	About 40 in total, at the moment 38 (of which 30 on sites, the rest at the office)
Currency	Euro
Type of employees	Foremen, construction workers, craftsmen
Type of work	Main contractor
Member State of establishment:	Finland
Number of dedicated OSH Officers	None, however some employees (e.g. foremen) devote part of their time (approx. 2 days/month) to OSH. Combined, all related OSH duties could end up to one full-time employee a year.
Estimated annual expenditure on OSH	Unknown by company
… major accident	Over 10 years ago
… minor accident	A month ago
… near miss incident	A month ago

Construction sub-sector	Tick applicable boxes
F41.2 – Construction of residential and non-residential buildings	☒
F42.1 – Construction of roads and railways	☐
F42.2 – Construction of utility projects	☐
F42.9 – Construction of other civil engineering projects	☐
F43.1 – Demolition and site preparation	☒
F43.2 – Electrical, plumbing and other construction installation activities	☐
F43.3 – Building completion and finishing	☒

7.2 Background information

Outline of company OSH policy

The company follows its own OSH initiative policy with the purpose of making sure that minimum standards are met but going beyond this, ensuring that safe working also supports productivity and quality gains. Guidelines and training are provided to employees, and internal inspections of crane sites and cranes are frequently undertaken.

The CEO of this SME is responsible for OSH practices. Monthly reporting is does efficiently and comprehensively across all projects, with a focus on risk identification and defining mitigating measures. The foremen are responsible of the weekly site safety risk reports. The foremen advise on site development and risk identification aiming at keeping in mind safety measures. Electronic communications are using mobile phones/pads makes to report risk and explain how things should be fixed. The aim is that ongoing site improvements in safety beyond what is required will reduce risks substantially and make site working easier and more productive.

Motives for OSH prevention

The company states that the main motives for OSH prevention are to stay in the working-life as long as possible, to have fewer sick leaves, and higher well-being.

The top-3 motives to participate in OSH prevention:

- Safety of workers;
- Quality of work;
- Lower costs of accidents.

The company has hardly any turnover of employees. The company thinks good OSH can improve productivity. It could have an impact of 10-20 percent. Site introduction is necessary.

Outline of risks

The main risks result from debris and airborne particles due to the demolition works and transportation of the rubble offsite. The typical accidents that happen are minor. The number varies yearly, but depending on the project, 5-15 minor accidents occur a year. The last accident was an eye injury due to an airborne particle. Eye injuries and cuts are the most common minor accidents, with 10 occurring per year. Some fractures have occurred due to falling. However, near miss incidents are also a “problem” with around 20 occurring per year. The company had a major accident over ten years ago, resulting in a death of an employee.

A further risk is when employees conduct themselves in a carefree manner even after receiving training and after risks have been identified. For instance, inspections reveal untidy sites and poor site organization reduce productivity and increase risks. In Finland, the icy conditions also make matters worse if employees do not pay attention, especially when entering and leaving the site. To avoid fines, on site everyone must wear helmet, and use working time reporting. Non-authorised persons are another risk if they enter the site, especially if the site is near a commercial area with walkways that are typically used by pedestrians.

For typical accidents, the costs of medical care are not high. Often the employee can take care of themselves with the onsite medical equipment although it means that the site can be slowed down for a brief period. The training costs are the highest cost (considering the costs of the training and the fact that fees are lost), as well as purchasing new safety equipment for new employees.

7.3 OSH Initiative(s) profile

Awareness and use of sector initiatives regarding prevention measures on OSH

The national OSH initiatives in the sector are not familiar to the company at the moment. However, the company has developed its own policy that combines training and inspections to go beyond minimum requirements.

Other measures

There are other measures that the company employs to mitigate the financial impact of accidents without actually reducing the accident rate. These are:

- The insurance company has launched a new service a few months ago. The company can have an experienced construction specialist for a visit on sites and identify risks, and give additional guidelines. It seems good and beneficial, and it pays itself;
- Health check-ups provided to staff;
- Softer skills are also focused on via training sessions to improve communication, organisation and interaction. Taking good care of site tidiness is important for the company; for safety, and

also for well-being of the workers. This requires ongoing communication of problems when identified and task allocation;

- The developer has a safety coordinator who takes into consideration risks elimination already at the planning phase. It can be the supervisor / inspector or another person. The company must therefore engage with these persons to ensure their risk and safety planning are aligned.

7.4 Observed impacts of the measures

All in all, the interviewee thinks the measures' benefits are hard to quantify in a SME and it takes some years to see the results of OSH work. However, the feeling is that without ongoing OSH measures, the company would operate at slower pace on site and would be exposed to more risks.

7.5 Costs and benefits identified in financial framework

The interviewee estimates that the costs and impacts in the financial sheet are quite well estimated. E.g. the company has no accidents of falling from heights, machine accidents, but impact would naturally be large. However, e.g. mental tension, burn-out would be more expensive than indicated, considering that the time spent on leave would be costly, plus training / communication to staff would also need to be done to address the staff shortage. On the other hand, rebuilding scaffold and loss of tools seems much more expensive than the true cost. Extra repeat training after a major cutting injury would be an estimated four hours, although extra training is not given after minor accident. The company has not had any civil claims.

The financial sheet is more detailed than the SME is used to. However, the interviewee responded positively to it and would be interested in learning how to use it.

8 France – Léon Grosse

8.1 Company profile

Company profile		
Company name:		Léon Grosse
Company size (Number of employees):		2,300 workers/employees (+ ca 10,000 employees working with subcontractors)
Currency		Euro
Type of employees		All types of profiles and construction workers Majority of employees are full-time, permanent contract staff.
Type of work		Main contractor on most construction works
Member State of establishment:		France
Operation in other EU MS:		No
Dedicated OSH Officer		Yes. 18 employees working full-time on OSH, representing 0.8 percent of total staff.
Estimated annual expenditure on OSH		Direct social security costs: approx. € 4.8 million (corresponding to ca 5 percent of salaries) Indirect costs: estimate: 3 to 4 times the direct cost Personal Protective Equipment supplies cost: € 450,000 Collective protection equipment costs: € 1 million
Estimated time since last …	… major accident	1 month
	… minor accident	1 week
	… near miss incident	1-5 days

Construction sub-sector	Tick applicable boxes
F41.2 – Construction of residential and non-residential buildings	☒
F42.1 – Construction of roads and railways	☐
F42.2 – Construction of utility projects	☒
F42.9 – Construction of other civil engineering projects	☒
F43.1 – Demolition and site preparation	☐
F43.2 – Electrical, plumbing and other construction installation activities	☒
F43.3 – Building completion and finishing	☒

8.2 Background information

Outline of company OSH policy

The company of the interviewee sees occupational health and safety as a major consideration. The large amount of permanent staff implementing OSH standards shows that OSH is taken seriously. The company recognises the fact that accident rates and safety standards in the construction sector in France still face many challenges. In comparison to other industries, such as the chemical and the petroleum industries, the French construction sector is lagging behind when it comes to ensuring safety standards protecting worker's health. The sector is currently struggling to catch up. As such, the OSH officers try to bring their company up to speed with latest OSH standards.

Léon Grosse indicates as its motives for investing in OSH measures and initiatives are first of all the safety of their workers, reducing the costs occurred by work-related accidents, and ensuring full legal compliance. The increase of worker loyalty is a secondary consideration. Only once the first objectives are fulfilled will the improvement of the company's reputation start to become a motivating factor.

Outline of risks

The company aims to offer a full palette of services in private and public contracts. Its offer covers every phase of the construction process, from conceptual stage to finalisation. As such, it is subjected to all the most common types of risks encountered in the construction sector. The biggest risk category, with the highest number of accidents, is falls. In terms of frequency, the significant size of the company, the range of services offered, together with the risky nature of construction works, means that accidents are a common occurrence in the company. The company estimates that heavy accidents happen on a monthly basis, lighter ones weekly. Near miss incidents can happen multiple times a week, almost occurring daily.

On average an accident leads to a loss of 46 days of work. This high number is due to the nature of accidents in the construction sector which often inflict major injuries. However, accidents have usually little implication on the timely delivery of the work by the interviewed company. The company is able to replace almost all the lost hours by employing replacement staff. The company does not pay any direct medical costs incurred through these accidents. Being subject to the French social security system, it is the latter that covers medical costs of workers. The company does, however, pay indirectly in the form of annual contributions to the social security regime. These expenses amount to around € 6 million annually.

8.3 OSH Initiative(s) profile

Awareness and use of sector initiatives regarding prevention measures on OSH

The company has good awareness of several initiatives regrading prevention measures on OSH in the sector and nationwide. Firstly, the company is embedded and active in the institutional structure of the numerous organisations dealing with questions related to OSH and prevention in France. The company is represented and active member of the Fédération Française du Bâtiment (FFB), a network of the majority of French construction companies, local and regional federations and trade unions. As part of this federation, numerous initiatives regarding OSH have been launched.

The company is also engaged with the 'Organisme professionnel de prévention du bâtiment et des travaux publics' (OPPBTP), which acts as the central platform for all questions related to OSH in construction on the national level. The OPPBTP as an organisation is the result of a cooperation between representatives of the construction companies, trade union representatives, and the public authorities. The company is indirectly represented and actively supports the organisations efforts and draws on the offerings presented by it. The OPPBTP supports the participating companies with risk- analysis within their profession, with a complete documentation offer, and in implementing training plans.

Initiative 1 profile	
Initiative name:	D.U.E.R. 3.0
Owner of initiative	Léon Grosse, Department for Quality-Safety-Environment at national level, Laurent Loyer
Type of initiative:	Nation-wide, continuous improvement of the OSH management system

Initiative 1 profile	
Risk(s) addressed:	Legal risks and identification of hazards
Type(s) of intervention	Creation of software to evaluate the relevance of the actions undertaken and to measure the effectiveness of evaluations
When was initiative implemented (at company)	The software was launched in September 2019 and is now in operation
Cost elements of the measure:	Three years of development at a cost of around € 10,000
Funding or support received from initiative	No external funding was received, it was paid for with internal resources only

Initiative 2 profile	
Initiative name:	Study to improving the working conditions in concrete formwork
Owner of initiative	Syndicat professionnel des entreprises générales françaises de BTP (“French trade union of general construction companies”) (EGF.BTP) OPPBTP (“French Professional Agency for Risk Prevention in Building and Civil Engineering”) Occupational Health Services (Sist-BTP). In cooperation with four private companies.
Type of initiative:	Sector-wide
Risk(s) addressed:	Formwork can cause musculoskeletal disorders in construction workers, and are also confronted with working rhythms that depend on the organization of tasks (cycle, co-activity, etc.) and use constraining materials and tools
Type(s) of intervention	The initiative consists in a study over multiple phases eventually leading to an action plan by engaging entrepreneurs and stakeholders in a dynamic with appropriate information enabling them to implement action plans.
When was initiative implemented (at company)	2015-2016
Cost elements of the measure:	Unknown
Funding or support received from initiative	Unknown

Other measures

There are other measures that the company employs to mitigate the financial impact of accidents without actually reducing the accident rate. The company takes legal action in cases where employees are absent from work for self-declared, alleged health reasons. If any doubts arise about the authenticity of the accident, the company seeks to investigate the case. It then signals the case to the French social security authorities and seeks to sue the potentially cheating employee. The investigations by the company show that a significant percentage of alleged work-related accidents and injuries and the ensuing absenteeism is fraudulent. About 25 percent of absenteeism cannot be duly justified.

8.4 Observed impacts of the measures

In terms of direct benefits, overall, the company estimates that its OSH prevention measures amount to savings of around € 100,000 per month.

In terms of indirect impacts, the company's OSH officers believe that measures will foster a change of mentalities with regards to safety. The officers perceive mentality issues as the main cause for accidents. As such, the OSH measures aim to create a mentality where OSH standards a better respected and where safety considerations are taken more seriously. This is naturally a process that has to occur industry-wide and will be a slow process. Léon Grosse's OSH officers are confident that progress is currently being made.

8.5 Costs and benefits identified in financial framework

Undisclosed information.

9 Greece – HATEL

9.1 Company profile

Company profile		
Company name:		HATEL
Company size (Number of employees):		8 (plus 2 free-lancers occasionally)
Currency		Euro
Type of employees		2 permanent employees as white collar, 6 permanent employees as technicians + 2 free-lancer technicians.
Type of work		Subcontractor in telecommunications and electrical installations projects
Member State of establishment:		Greece
Operation in other EU MS:		Cyprus
Dedicated OSH Officer		Yes, fulltime employee (5 percent of time)
Estimated annual expenditure on OSH		€ 4,000 (€ 1,200 for training, € 1,500 for PPE and € 1,300 in safety expert and trainees' hours devoted)
Estimated time since last …	… major accident	Never
	… minor accident	3 months
	… near miss incident	3 weeks

Construction sub-sector	Tick applicable boxes
F41.2 – Construction of residential and non-residential buildings	☐
F42.1 – Construction of roads and railways	☐
F42.2 – Construction of utility projects	☐
F42.9 – Construction of other civil engineering projects	☐
F43.1 – Demolition and site preparation	☐
F43.2 – Electrical, plumbing and other construction installation activities	☒
F43.3 – Building completion and finishing	☐

9.2 Background information

The company considers OSH as a priority corporate value. Apart from the minimum legal obligations, working as a subcontractor of large telecommunications enterprises requires to comply with even more strict requirements set by the OHS policies of the latter that extent to the former in contracting. Furthermore, HATEL aims to go even further, having realised the benefits for the enterprise (reliability and predictability in quality and delivery time, lower overall costs, etc.) which also gives competitive advantage in a very demanding market. Moreover, due to the complex requirements for personnel (highly specialised personnel in telecommunications required to work at height, exposed to weather or in confined spaces) a safe environment is very important to maintain a longer job tenure, as replacing specialised technicians is difficult. Finally, due to the small size of the enterprise, the owner-manager is directly exposed to legal implications of any serious accident, which provides another motive for pursuing higher levels of OSH.

Outline of company OSH policy

The OSH policy of the enterprise has been formed in a way to serve its requirements and goals.

Although the enterprise faces a number of workplace risks (slips and trips, fall of metallic pieces or structures, equipment-related risks, electrocution, exposure to weather conditions, animal bites, etc.) the major risk is fall from height, due to its severity. Such an incident would have a major impact even to the existence of the company. Therefore, the latter has a major influence in formation of the whole prevention policy (it actually accounts for more than half of its annual investment in OSH).

The overall surveillance of OSH goals and policy is done by the owner of the enterprise, who is an engineer experienced in OSH. Safety officer (who is a technician/engineer having undertaken these duties) is responsible for the implementation of the policy. Being a small enterprise, the goal is no accidents, however, the focus is on avoidance of major incidents, falling from height being the first priority. Moreover, a number of risks could evolve to major (e.g. electrocution, animal bites, trapping, etc.) in case of lone working, so the enterprise has a policy of full avoidance of lone-working in the field.

Motives for OSH prevention

Although there are many motives for OSH, the top-3 motives of HATEL for OSH prevention are:

- *Worker loyalty*. Telecommunication projects have high demands for workers. They have to be specialised in certain technologies, being willing at the same time to work in difficult conditions, including working at height, in confined spaces or in the wild (e.g. antennas placed in mountain tops). Workforce turnover is a major burden for such enterprises. One of the main ways to reduce this and prolong job tenure is through improvement of working conditions, OSH included. Workers not only need to be safe but to feel safe as well;
- *Company reputation*. Working in a bounded market such as telecommunication projects, company reputation is about the image of the enterprise within this market. By minimum, this reputation requires compliance to the OSH policies of large telecommunication companies for contractors' OSH (legal requirements included), as well as excellence that will add to contracting opportunities;
- *Quality of work*. Especially in projects of high specialisation, like those in telecommunications, quality of work is a major parameter. Poor quality is always detected and it usually leads to rejection of the delivery and revisit, which makes economic costs directly visible. Moreover, poor quality affects company reputation and contracting prospects. Therefore, assurance of quality is of particular importance. Quality in such works is a holistic issue, including OSH, procedures and code of conduct, environmental policy further health and safety issues (hygiene, driving policy, use of substances, etc.) that form the whole service package. Particularly for OSH, the feeling of safety is a prerequisite for concentration in quality critical works.

Outline of risks

The major risks that the company faces are:

- Fall from height: Never occurred so far. Could be catastrophic with possible death and costs above € 200,000 (mainly civil claims);
- Slips and trips: About 1 incident every 2 years. Usually the cost includes a few days out of work or in low duties (cost less than € 1,000);
- Electrocution (including thunder): Never occurred so far. Could be catastrophic with possible death and costs above € 200,000 if fatal (mainly civil claims);
- Falls of pieces or metallic structures (antenna frames): No incident occurred so far (only near misses). Could have a serious injury and material disaster. Could cost between € 10,000 and € 100,000 including material and equipment damage (antenna) and injury civil claims;
- Equipment-related accidents. No injuries occurred so far. Could cause minor injuries, as no particular equipment is used (cost less than € 1,000);

- Traffic accidents. Usually 1 incident every 2 years but without injury (about € 500 repairing cost annually);
- Animal bites. Never occurred so far. Could lead to a minor injury (cost of less than € 1,000 due to absenteeism / presenteeism);
- Exposure to weather conditions (heat or cold). No serious incident happened so far. It is a continuous burden for workers and could cause minor injuries or sickness with mainly presenteeism or absenteeism costs (less than € 1,000).

9.3 OSH Initiative(s) profile

Awareness and use of sector initiatives regarding prevention measures on OSH

The most relevant initiative (for all sectors, including construction) is indirect funding of vocational training through the Fund for Employment and Vocational Training. This is an initiative for all sectors that allows enterprises to claim back some insurance contributions to pay for vocational training. However, the available sum is too small for specialised training for a hi-tech construction company like HATEL, which does not make it worth the bureaucracy to claim back.

Another relevant initiative comes from some clients (telecommunications) who require a "safety-pass" (i.e. a card that verifies that the worker has been properly trained on safety for the duties written on the card) for every worker to allow (construction contractors too) them to enter. This leads to proper training but it is not compulsory. Material from ELINYAE and the Ministry of Employment and Social Protection about Work in Height and Working in Antennas were also useful as references.

Initiative 1 profile	
Initiative name:	Training
Owner of initiative	Ministry of employment and social protection/Social Partners
Type of initiative:	Nation-wide
Risk(s) addressed:	Part of vocational training. The company performs training against falling from heights, overall OSH management, and 1st Aid.
Type(s) of intervention	E.g. training, guidance material, knowledge sharing, consultancy, online tools, new equipment, unspecified, etc.
When was initiative implemented (at company)	The company aimed to use it for 2017-2018 (using contributions of two years, which is the maximum allowed), but did not complete it as it found out that bureaucracy outweighed the economic benefit.
Cost elements of the measure:	• 3 work-days (24 hours) x 6 workers = 18 work-days • € 1,200 (for training costs)
Funding or support received from initiative	No (it could be paid for all expenses but only up to € 150, which was its contribution deposit share)

Initiative 2 profile	
Initiative name:	Safety pass
Owner of initiative	Private company (Vodafone)
Type of initiative:	Private

Initiative 2 profile	
Risk(s) addressed:	Heavy lifting, falling from heights, overall management, 1st Aid
Type(s) of intervention	Training (minimum training requirements to allow individual workers to enter the site)
When was initiative implemented (at company)	Permanent
Cost elements of the measure:	• 3 work-days (24 hours) x 6 workers = 18 work-days • € 1,200 (for training costs)
Funding or support received from initiative	No (it is a minimum requirement to win a contract with the specific client)

Initiative 3 profile	
Initiative name:	Brief guide for the health and safety of employees in buildings and construction projects
Owner of initiative	Ministry of employment and social protection
Type of initiative:	Sector-wide
Risk(s) addressed:	Electricity, Heavy lifting, Falling from heights, Falling objects, Slips and trips.
Type(s) of intervention	Guidance material
When was initiative implemented (at company)	Permanent
Cost elements of the measure:	None (free material)
Funding or support received from initiative	No

Initiative 4 profile	
Initiative name:	Health and Safety for workers in maintenance works of mobile telephony antennas
Owner of initiative	Hellenic Institute for Occupational Health and Safety (ELINYAE)
Type of initiative:	Sector-wide
Risk(s) addressed:	Falling from heights, Falling objects, Exposure to Weather
Type(s) of intervention	Guidance material
When was initiative implemented (at company)	Permanent
Cost elements of the measure:	None (free material)
Funding or support received from initiative	No

Other measures

There is another measure that the company employs to mitigate the financial impact of accidents without actually reducing the accident rate (e.g. work accident insurance, health check-ups). The company offers smoking disruption incentives to its workers (an internal lottery) to improve overall health.

9.4 Observed impacts of the measures

The main two discrete measures of the enterprise for OSH are PPE and OSH training. Procedures of work include OSH, but they are not discrete, as the protocols (usually imposed by the large telecommunication enterprises) combine quality, environmental policy and OSH. Therefore, procedures cannot be considered as an OSH measure, since they are mainly externally imposed

and not solely for OSH. PPE and training are also included in externally imposed requirements, but they are not described in detail (like procedures). For example, quality, replacement period and number of available PPE are factors of differentiation between enterprises. The same happens with specific features of training.

For a small enterprise like HATEL, accidents are rare when seen in an annual basis, but the impact of each accident is much higher than in a large enterprise with enough resources for covering up. A major accident could lead the enterprise out of business and its owner to serious problems. Therefore, there is no stable accident rate to observe its decline after some measures: it is a probability, rather than frequency that changes. Moreover, the enterprise has not made any major changes in its OSH policy to observe such profound changes.

Concerning PPE, the enterprise has a policy of high quality and frequently replaced equipment, as well as proper training in its use and maintenance. The owner of HATEL believes that this qualitative difference in minimum legal requirements (i.e. the existence of PPE) is a factor that significantly reduces the risk of accidents and mainly those that could have a serious injury (e.g. fall from height). Aiming to the same priority (to minimise the probability serious and possible fatal accidents that would lead to his personal and commercial destruction), the avoidance of lone working (if any job is done without the presence of another person from the client or another contractor, a second HATEL's technician is sent, even if not technically required) is applied. Regarding training, HATEL has a certain training programme for all of its technicians (the training programme is also attended by administrative personnel and free-lancers for culture development and acquisition of "safety-pass". Particular attention is given to fall-arrest PPE training and first aid (always aiming to reduce the likelihood of major injury or death). The enterprise does not have a policy for training after an incident, aiming to have a proactive and stable training procedure that is not coincidentally driven.

Although direct accident costs cannot be precisely calculated (due to absence of a stable and sizeable incidence rate), there are important indirect benefits (or costs avoided) due to its OSH policy. Increased job tenure (probably avoiding other economic provisions to balance poor working conditions) and a good reputation in a bounded market are important benefits that cannot be easily quantified, but they are obvious and very important. According to the owner, taking measures for OSH is like taking measures for good health. You cannot measure their benefit precisely, you cannot even be sure that they will work, but it is obvious that they worth it.

9.5 Costs and benefits identified in financial framework

Cost element	Costs	
Cost per worker of investment in safety equipment		
High voltage equipment / burners	Safety goggles + gloves combined	Cost per worker is about € 20 (instead of € 40) and they are annually replaced
Falling objects / Pinching, hitting by shot away objects	Safety helmet	Cost per worker is about € 80 (instead of € 160) and they are replaced every 3 years
Tripping or slipping	Steel-shod safety shoes	Cost per worker is about € 90 (instead of € 110) and they are replaced every 2 years

Falling from roof, platform, floor	Fall arrest equipment (not described in framework)	Cost per worker is about € 450 and they are replaced every 2 years
Costs of repairing or replacing equipment		
Machine accidents (incl. vehicles on-site)	Refers to damage in vehicles due to minor collisions without injury	€ 500 per year (usually 1 collision per 2 years)
Musculoskeletal stress	No equipment involved	0
Extra repeat training of all staff after an accident		
Collisions: L: Falling from < 2.5 m	Mainly slips and trips	No extra training took place after the incident
Musculoskeletal stress: L: Lifting, twisting, stepping	Musculoskeletal stress that led to presenteeism and absenteeism.	No extra training took place after the incident
Collisions: L: Falling from < 2.5 m	Recent incident of slip resulting to minor knee injury with presenteeism and absenteeism.	No civil claim existed. The injury was minor.
Musculoskeletal stress: L: Lifting, twisting, stepping	Musculoskeletal stress that led to presenteeism and absenteeism.	No civil claim existed. The injury was minor.

10 Lithuania – Undisclosed company

10.1 Company profile

Company profile		
Company name:		Undisclosed
Company size (Number of employees):		270
Currency		Euro
Type of employees		Construction workers
Type of work		Construction work, management of projects
Member State of establishment:		Lithuania
Operation in other EU MS:		
Number of dedicated OSH Officers		2 who devote 60 percent of their full-time to OSH
Estimated annual expenditure on OSH		
Estimated time since last …	… major accident	
	… minor accident	
	… near miss incident	

Construction sub-sector	Tick applicable boxes
F41.2 – Construction of residential and non-residential buildings	☒
F42.1 – Construction of roads and railways	☐
F42.2 – Construction of utility projects	☐
F42.9 – Construction of other civil engineering projects	☐
F43.1 – Demolition and site preparation	☐
F43.2 – Electrical, plumbing and other construction installation activities	☒
F43.3 – Building completion and finishing	☒

10.2 Background information

Company's OSH orientation is driven by its values: competence, quality and sustainability. Sustainability is understood broadly and involves sustainability of the company's activities and its impact on socio-cultural environment. Given competitive environment in construction sector, it is critical to ensure higher quality of work, which is only possible when workers stay longer with the company. So increasing employee loyalty and safety are most important goals of the OSH initiatives.

Outline of company OSH policy

Company has two dedicated OSH officers, who spend up to 60 percent of their time on OSH issues. Their secondary responsibility – quality control also relates to OSH. Company has set a goal to reduce number of incidents to 0. Due to their OSH efforts number of incidents is decreasing. In 2018 they had 16 incidents. In 2019 (first 3 quarters), they had 8. Their focus in 2019 is to reduce number of incidents related to falling (including incidents from slipping and falling objects/tools).

Motives for OSH prevention

The top-3 motives to participate in OSH prevention:

- Safety of workers;
- Worker loyalty;
- Company reputation.

Company's representatives consider human life as the primary and most important aspect. They believe that taking care of construction worker safety will translate into increased loyalty of workers. OSH measures will also improve company's reputation.

Outline of risks

The primary OSH-risk is falling from heights above ground. Company constructs residential (and non-residential) buildings, thus workers often are high above ground. Latest incident happened on 5 August 2019, when a construction worker fell from the ladder and broke his leg. The company does not track specific costs of these incidents, but they happened rarely. They attribute this achievement to pro-active OSH measures that company employs.

10.3 OSH Initiative(s) profile

Awareness and use of sector initiatives regarding prevention measures on OSH

Company representative is aware of OSH conference, but did not attend. They attended other conferences/events where same speakers were talking (http://www.dsskonferencija.lt).

Company representative has used interactive online recommendations for safety at work (https://www.vdi.lt/Mokymai/story_html5.html).

Other measures

There are other measures that the company employs to mitigate the financial impact of accidents without actually reducing the accident rate (e.g. work accident insurance, health check-ups). These are:

- Provides personal safety equipment for construction workers (estimated expenses € 60K-70K per year);
- Provides collective safety equipment (estimated expenses € 60K-70K per year);
- OSH training for workers (up to € 20,000 per year);
- Purchases OSH consulting services to improve OSH measures (up to € 10K per year);
- Purchases OSH coordination services (up to € 10K per year);
- Insurance (unspecified).

Company does not track specific costs savings of these measures. It is estimated that costs only increase, but likelihood of accidents is reduced.

10.4 Observed impacts of the measures

Overall company representatives estimate following benefits of OSH investments into company OSH measures.

Benefit	Impact on production / hiring (%)
Change in efficiency (for example: fewer near-misses)	20
Lower absenteeism for personal safety concerns	20
More projects / less idle time between projects due to quality work	10
Reduced hiring costs due to less staff turnover	10

More specific results of investment.

Measure taken	Estimated value (%)
Procedures, handbooks, repair schemes	31
Adequate size and sufficient time of crew	6
Training in safety competences (1 day every year)	55
Training in culture (motivation, alertness, priorities) - 1 day every 5 years	47
One-of awareness / basic safety training (1 day)	10
Work communication / cooperation (10 hours per worker every year)	32
Safety material / equipment	50
Ergonomics (one-off check for posture during work)	10
Medical check-ups and testing every year	5
OSH safety coordinator(s)	60

10.5 Costs and benefits identified in financial framework

Cost element	Costs	
Cost per worker of investment in safety equipment		
Falling from ladder	One set of safety clamps	Cost of one set of safety clamp is about € 80
Falling from scaffold	Per month for safety scaffolding (price depends on amount of scaffolding).	€ 1,000 per construction object
Falling objects	One safety helmet with company's logo	€ 6.05
Presenteeism		
Collisions	L: Falling from < 2.5 m	5 months of presenteeism at 75% productivity
Extra repeat training of all staff after an accident		
Collisions	L: Falling from < 2.5 m	5 hours of extra training per worker

11 Lithuania – UAB Medžio forma

11.1 Company profile

Company profile		
Company name:		UAB „Medžio forma”
Company size (Number of employees):		5
Currency		Euro
Type of employees		Construction workers, cabinetmakers, auxiliary workers
Type of work		Interior design, furniture design
Member State of establishment:		Lithuania
Operation in other EU MS:		Unspecified
Dedicated OSH Officer		1, who works fulltime
Estimated annual expenditure on OSH		Unspecified
Estimated time since last …	… major accident	Never
	… minor accident	Never
	… near miss incident	Never

Construction sub-sector	Tick applicable boxes
F41.2 – Construction of residential and non-residential buildings	☐
F42.1 – Construction of roads and railways	☐
F42.2 – Construction of utility projects	☐
F42.9 – Construction of other civil engineering projects	☐
F43.1 – Demolition and site preparation	☐
F43.2 – Electrical, plumbing and other construction installation activities	☒
F43.3 – Building completion and finishing	☒

11.2 Background information

At its core company is primarily dedicated to its workers and strives to ensure the safest possible work conditions. According to interviewee, their goal is safety and accountability in terms of how well each and every single worker can perform their job: due to a necessity they try to be up-to-date with their safety gadgets and policy. As a small company, they find safety to be of utmost importance as it guarantees loyalty from workers and produces a positive impact on their work quality.

Outline of company OSH policy

Though they have one OSH officer, who is fully devoted to OSH related issues, their main goal is to engage workers and spread awareness that would motivate each worker to sustain a healthy and safe work environment individually. Since company is small and accidents quite rarely happen, OSH officer mainly focuses on general safety issues and materials, e.g. distributing safety goggles, checking up on equipment, relaying general information related to OSH to each worker.

Accidents do happen, but it is not fully disclosed what are the factual detriments that come out of these accidents; impactful or of negligent importance, these accidents are evaluated in a most pragmatic way, usually dealing with few workers – those that are employed – who are (were) injured.

Motives for OSH prevention

The top-3 motives to participate in OSH prevention:

- Safety of workers;
- Worker loyalty;
- Quality of work.

Outline of risks

Main concerns are practical: as company develops its targets positive initiatives remain. Ensuring safety is means to an end on its own. Although investing in new gear, outfits, tools is also a factor. Accidents that happen in this type of work are usually limited and/or situational, therefore ensuring that proper work ethic is followed, that workers are well equipped to deal with is to come, are fairly well stocked and have all the necessary appliances that they can expect, is enough to minimize potential risks, ensuring safe conduct at work is also a major point: in this sense, OSH initiatives are a measurement of how well company adjusts its values to keep workers satisfied – in a long term this is most important. Incident costs are directly conjoined with company's ability to combat these incidents in the first place.

11.3 OSH Initiative(s) profile

Awareness and use of sector initiatives regarding prevention measures on OSH

Interviewee is familiar with all three outlined initiatives (https://www.vdi.lt/Mokymai/story_html5.html, http://www.dsskonferencija.lt, https://healthy-workplaces.eu/lt), however they do not participate in these activities.

Other measures

There are other measures that the company employs to mitigate the financial impact of accidents without actually reducing the accident rate (e.g. work accident insurance, health check-ups).

The company spends about € 5,000 yearly disregarding old equipment and acquiring new, up-to-date equipment. They capitalize on OSH improvements in terms of technical check-ups. To prevent burns, shock impact (due to unsafe wiring and defective cables), usually they focus on general safety materials, environmental awareness, textbooks and look for guidance in OSH officer. Their baseline, when it comes to OSH, is in joint with workers' own responsibility – this is achieved by training and experience. Financial impact is not known.

11.4 Observed impacts of the measures

It is safe to say (as per information below) that company has a wholehearted interest in developing a worker-friendly and work-oriented environment; its dependency on few workers is a focal matter. Efficient work would not be possible without proper OSH framework. Thanks to a smaller chance of harm experienced by workers, which is entailed by the interior space where work is done, quality is prioritised.

Benefit	Impact on production / hiring (%)
Change in efficiency (for example: fewer near-misses)	70
Lower absenteeism for personal safety concerns	25
More projects / less idle time between projects due to quality work	5
Reduced hiring costs due to less staff turnover	0

More specific results on investment.

Measure taken	Estimated value (%)
Training in safety competences (1 day every year)	55
Training in culture (motivation, alertness, priorities) - 1 day every 5 years	47
Work communication / cooperation (10 hours per worker every year)	32
Safety material / equipment	50

11.5 Costs and benefits identified in financial framework

Cost element	Costs	
Cost per worker of investment in safety equipment		
Cost element 1	Safety goggles and gloves combined	€ 50
Cost element 2	Breathing mask, 2x per year for 10 years	€ 100
Cost element 3	Knife with better handle	€ 50
Cost element 4	Noise reduction barrier, one investment per 5 workers	€ 70

As per interviewee, they generally aim to produce all-around safe environment and, upon discovering any type of harm reduction benefit, they tend to apply it as a principle. This does not negate the fact that interviewee would not disclose all benefits and did not detail the costs of harm reduction – nonetheless, it is clear that they seek to improve their long term economic and OSH situation; needless to say, company has a small staff which entails that harm reduction is a priority and it would not be possible to sustain its livelihood by shrugging off OSH issues or ignoring them. It is safe to deduce from the information given, company has a clear picture of OSH related hazards, issues and problems, but due to size its range in competence how to deal with these issues is limited to practical applications specifically.

12 Latvia – Undisclosed company

12.1 Company profile

Company profile		
Company name:		Undisclosed
Company size (Number of employees):		124
Currency		Euro
Type of employees		The company consists of more 124 professionals, including office employees (accounting, HR, etc.), OSH specialists, project managers, assistant project managers, construction managers, engineers from various fields, and production workers.
Type of work		Main contractor. The company is one of the leading construction companies in Latvia, which plays an important role in the development of state infrastructure. They do construction and design work, designing of bridges, roads, structures, architectural design and wide-ranging engineering communications, as well as all other services necessary for commissioning the object.
Member State of establishment:		Latvia
Operation in other EU MS:		The company offers contractor services in Sweden, providing solutions for any construction volume, and uses innovative technologies to implement a responsible environmental policy. The company is experienced in project implementation in Latvia, Scandinavia, Eastern and Western Europe.
Dedicated OSH Officer		Yes, 3 OSH officers who work fulltime
Estimated annual expenditure on OSH		There is no track for the total amount of an annual OSH expenditure, it depends and varies from project to project. As the OSH's budget is project-based, with no detailed or yearly financial planning. Because the company is the main contractor, no detailed accounting is done regarding OSH expenditure. A specific project purchases for security equipment is made on a project-budged basis to cover the needs for current or new employees of the project. The approximate amount for the OSH expenses makes up from 3% to 5% from the total project cost.
Estimated time since last	… major accident	5 years
	… minor accident	1 year
	… near miss incident	1 month

Construction sub-sector	Tick applicable boxes
F41.2 – Construction of residential and non-residential buildings	☒
F42.1 – Construction of roads and railways	☒
F42.2 – Construction of utility projects	☐
F42.9 – Construction of other civil engineering projects	☐
F43.1 – Demolition and site preparation	☒
F43.2 – Electrical, plumbing and other construction installation activities	☒
F43.3 – Building completion and finishing	☒

12.2 Background information

The company offers services of construction “from zero” and renovation. The company employs the best experts from their respective areas who help the company deal efficiently with any construction challenges that may arise. They have certified the quality management system according to the international ISO 9001: 2008 standard, the environmental management system according to ISO 14001: 2004, the occupational health and safety management system according to LVS OHSAS 18001: 2007 and the energy management system according to ISO 50001: 2011. The high quality of the company's work is also evidenced by the annual diplomas and awards of the Latvian Builders Association and the Latvian Association of Electric Power and Power Builders in all areas of the company's activities. While being aware of the inevitable environmental impact of construction work, the company has formulated policy on energy management and environmental protection, choosing environmentally friendly materials as much as possible, carefully monitor energy efficiency and reduce energy consumption during construction. By valuing the role of specialists in the success of the company and the responsibility for compliance with labour law, the company provides employees with health insurance and professional salaries in the construction sector.

Outline of company OSH policy

The policy is to provide a wide range of qualitative, standards-compliant services to their clients and provide high OSH standards within the company. To implement these principles, the Company's quality policy is based on the following guidelines:

- Identifying the wishes of our customers (our customers) and raising the standard of service;
- Optimization of construction work and reduction of construction process costs;
- Developing a customer-friendly pricing policy;
- Fulfilment of all requirements of the laws and regulations of the Republic of Latvia, including environmental, occupational health and safety legislation;
- Upgrading the professional qualifications of staff and awareness of the staff's environment and safety at all levels in each workplace;
- Increasing the operational efficiency of the integrated quality, environment, occupational health and safety management system developed and implemented by the company.

In view of the increasing demands regarding environmental protection and occupational safety, one of the main tasks of the company is aimed at continuously improving the environmental performance and safety of the company in order to reduce as far as possible the potential risks and the environmental impact of the company. To implement this principle, the company's environmental and work safety policy is based on the following guidelines:

- Identification and reduction of potential environmental and occupational safety risks in the workplace and vis-à-vis the surrounding population;
- Development of the necessary equipment operating regulations, labour protection instructions, their acquisition;
- The purchase and supply of necessary personal protective equipment, work clothing and protective equipment, as well as its timely testing, repair, washing;
- Carrying out compulsory health surveillance of workers;
- Comprehensive training of workers in safe working practices;
- Rational use of resources;
- Waste management in accordance with Latvian legislation.

Motives for OSH prevention

The top-3 motives to participate in OSH prevention:

- Legal compliance. Legal compliance is very important, as everything company does is to make sure that business is covered OSH-wise in many different ways from the legal point of view. It is important to avoid accidents while protecting the good reputation of the company;
- Safety of workers. The ultimate goal for the company and for OSH specialist is to make sure that every worker is safe and leaves the site in the state he/she arrived to work. Any construction work can be done safe and should be done safe;
- Company reputation. The reputation of the company is very important; accidents do not affect the quality of work, but essentially the reputation of the company.

Outline of risks

The most common risks for the company are working at height, and requires the use of suspension systems; noise risks; also attitude towards work is more of a psychological risk to face in everyday work situations. For example, regarding the use of safety goggles, as a worker had refused to wear them, claiming that it is his business and his eyesight on the line and not abiding OSH specialist's suggestions. The risk in this case is psycho-emotional and shows ignorance or lack of understanding about work safety and health. This is a proof that a local OSH specialist is needed on the construction and building site to check and make sure that every member of the team puts safety requirements in use. The work in such cases is halted until the situation is resolved, only then the work can be restored and continued. Overall, the main risk is work at height as well as the risk of construction parts falling. Latest incident happened couple of months ago and it was a sprained ankle for an employee walking down the stairs – the only costs were the cost of sick-list for 5 days. Thankfully, incidents are not frequent and happen rarely.

12.3 OSH Initiative(s) profile

Awareness and use of sector initiatives regarding prevention measures on OSH

The latest initiative that company`s OSH experts took part, was launched in 2018, in cooperation with the Partnership of Latvian Constructors was developing safety video series for construction companies, intended as a useful and interesting addition for training of construction company employees. The videos properly explain the essential work safety requirements and also prepare the viewers to think that only individual's own alertness and awareness will be the decisive factor for safe site work. Creating such safety videos is a good practice and can serve as an example for other industries as the industry demonstrates its ability to collaborate and co-create educational material that can reduce accidents and even save lives.

Objective of the initiative: To improve the occupational safety situation in the construction industry. Video footage is a good way to reach construction workers in a more lively format. It helps to understand what can happen and what to do in order to improve the construction working culture in Latvia Involved parties: Partnership of Latvian Constructors and four of the biggest construction companies and the members of the Partnership**.** Target audience: Construction companies in Latvia.

Regular meetings are made within the Partnership of Latvian Constructors regarding work safety related questions. Also meetings with State Labour Inspection take place to exchange of experience, accident cases do discuss the biggest common problems in the field concerning OSH.

In this particular construction project we also have an initiative called the BREEAM (British Research Establishment Environmental Assessment Method) it`s a system allows the assessment

of different types of buildings (offices, shopping centers, apartment buildings, schools, hotels, hospitals, etc.) according to different sustainability criteria. BREEAM helps to assess how the construction process affects the environment, that also includes OSH. The BREEAM requires that all information should be available in all languages and instructions should be comprehensible to all employees, sustainable working environment should be provided for employees, including OSH prevention and many other important OSH aspects.

Initiative 1 profile	
Initiative name:	Work safety video for construction companies
Owner of initiative	Organisation: Partnership of Latvian Constructors
Type of initiative:	Sector-wide
Risk(s) addressed:	Overall management; heavy lifting; personal protective equipment risks; risks when moving cargo; risks in working with mobile equipment; risks when repairing machinery; electrical safety risks; risks during excavation; risks while working at height; chemical safety risks; fire risks on site; risks working indoors; physical health risks through manual work; post-accident handling.
Type(s) of intervention	Training videos, guidance material, knowledge sharing, consultancy, as an additional audio-visual informative tool and a part of construction trainings.
When was initiative implemented (at company)	From 17.12.2018 – until the information is up to date.
Cost elements of the measure:	• Estimated number of work-days to implement – 6 months; • Estimated amount of costs for the company– no additional costs, OSH specialist's salary (undisclosed).
Funding or support received from initiative	No

Initiative 2 profile	
Initiative name:	BREEAM
Owner of initiative	Organisation "Attīstības aģentūra"
Type of initiative:	Private
Risk(s) addressed:	Risks that are related on how the construction process affects the environment, health and safety.
Type(s) of intervention	Training, guidance material, knowledge sharing, consultancy, instructions, new equipment and tools, quality measures, environmental protection, sustainable construction.
When was initiative implemented (at company)	Project-based time from 2017 – 2020.
Cost elements of the measure:	Depending on the project – various cost elements starting from top quality materials to administrative costs.
Funding or support received from initiative	Yes, salary for the OSH specialist.

Other measures

There are other measures that the company employs to mitigate the financial impact of accidents without actually reducing the accident rate (e.g. work accident insurance, health check-ups).

Other measures include: training sessions, individual instructions, regular OSH monitoring by the OSH specialist on the construction site, also various informative posters are developed, thematic informative materials, warning signs, and regular check-ups before start of the work and during work, strict control of PPE on site. Regular site inspections are carried out. A mandatory training is provided for every person/employee that steps on the construction site. Before starting the work, employee receives training and instructions, after the trainings the employee has to complete tests and the result of those tests must be at least 80 percent correct for the person to be allowed to work on the site. Costs cannot be estimated in detail.

12.4 Observed impacts of the measures

Exact costs of work related accidents cannot be precisely measured, mostly prevention work is being implemented – each employee working on the site or in project is provided with health insurance that covers most health related costs.

12.5 Costs and benefits identified in financial framework

Cost element	Costs	
Cost per worker of investment in safety equipment		
High voltage equipment / burners	Safety goggles + gloves combined	Cost per worker is about € 30 and they are annually replaced
Falling objects / Pinching, hitting by shot away objects	Safety helmet	Cost per worker is about € 15 and they are replaced every 3 years
Tripping or slipping	Steel-shod safety shoes	Cost per worker is about € 90 (instead of € 100) and they are replaced depending on the usage and the need
Falling from roof, platform, floor	Noise reduction barrier	Cost per barrier is about € 900

13 Latvia – BUKOTEKS Ltd.

13.1 Company profile

Company profile		
Company name:		BUKOTEKS Ltd.
Company size (Number of employees):		20
Currency		Euro
Type of employees		10 administrative, office employees; 10 construction workers.
Type of work		Main contractor on: Construction Works, Consultancy Services, Technical Supervision
Member State of establishment:		Latvia
Operation in other EU MS:		Latvia, Lithuania
Dedicated OSH Officer		Yes, fulltime
Estimated annual expenditure on OSH		Undisclosed information.
Estimated time since last …	… major accident	Never
	… minor accident	Never
	… near miss incident	Never

Construction sub-sector	Tick applicable boxes
F41.2 – Construction of residential and non-residential buildings	☒
F42.1 – Construction of roads and railways	☐
F42.2 – Construction of utility projects	☐
F42.9 – Construction of other civil engineering projects	☒
F43.1 – Demolition and site preparation	☐
F43.2 – Electrical, plumbing and other construction installation activities	☒
F43.3 – Building completion and finishing	☐

13.2 Background information

BUKOTEKS Ltd. is a main contractor company engaged in general construction activities.

The construction related services include planning, supply, integration, installation, building, repairs, and reconstruction. The company offers fully developed business conceptions for new construction, as well as for reconstruction and repair works. Before the start of a project, the staff performs feasibility analysis and coordinates the project design including management and coordination the implementation of construction works, building and installation process, deployment of electrical installation, ventilation, air conditioning and refrigeration systems, installation of heating systems, internal water supply and sewerage networks, decoration works. The motto of the company: **"Develop an idea and deliver a turnkey solution"** is also the company's business philosophy. BUKOTEKS Ltd. operates across Latvia.

Outline of company OSH policy

The main person in the company who is responsible for reaching the objective is the company's OSH safety officer. The company implements an integrated quality system to improve the quality of work, the quality system helps to manage and guide the work processes. Mostly the company carries out various OSH trainings – practical and theoretical training for each of the staff member,

seminars, annual instructions and trainings at the beginning and during each new construction project. In the past 5 years there have not been recorded any minor or major OSH related accidents nor a near-miss accident, which means that the company takes the OSH procedures seriously and invests time and money resources to manage the OSH efficiently.

Motives for OSH prevention

The top-3 motives to participate in OSH prevention:

- *Legal compliance.* It is understood that legal requirements and compliance is mandatory for every company working in the building industry which is the case for BUKOTEKS Ltd. as well;
- *Safety of workers.* Is of utmost importance to the company and is an essential part of the daily work;
- *Company reputation*. Is also as significant as the quality of work that we do.

Outline of risks

Specific groups of risks that are relevant to the company's daily work:

- Environmental risks: draft, environment, work outdoors/indoors, air humidity, temperature, etc.;
- Physical risks: work in restricted pose, local muscle sprains, moving of various weights, etc.;
- Risks of trauma: work at height, physical injuries, falling, moving, slipping, handling equipment, etc..

As there has not been a record on an accident in the past years, logically there is not a specific risk that would be related to an accident. The company does not save resources on work health and safety and quality management; therefore, overall there are good results and excellent record of accomplishment in OSH prevention during construction works.

13.3 OSH Initiative(s) profile

Awareness and use of sector initiatives regarding prevention measures on OSH

Generally, there are trainings and workshops within the company that are led by the main OSH specialist, although company also outsources specialists from other companies dedicated to more specific OSH risks such as Occupational Safety Center and other organizations that cover specific risks such as work at height. For example, recently Latvian State Labour Inspectorate took part in organising an international two-day long conference on Psycho-Emotional Risks at Work. In the beginning of November there was also a seminar dedicated to the implementation of the new ISO 450001 standard dedicated to occupational health and safety at work management system. At the moment, there is ongoing recertification on the new system that the company is partaking in.

The most current initiative that BUKOTEKS`s Ltd. OSH specialist also took part to develop was launched in 2018, in cooperation with the Partnership of Latvian Constructors. The initiative provides video series for construction companies, intended as a useful and interesting addition for training of construction company employees. The videos help to explain and illustrate the essential work safety requirements and also motivate the construction workers to think that only individual's own alertness and awareness will be the decisive factor for the safety during construction work.

Objective of the initiative: To improve the occupational safety situation in the construction industry. Video footage is a good way to reach construction workers in a more lively format. It helps to understand what can happen and what to do in order to improve the construction working culture in Latvia. The involved parties: Partnership of Latvian Constructors and four of the biggest construction companies and the members of the Partnership**.** Target audience: Construction companies in Latvia.

Initiative profile	
Initiative name:	Work safety video series for construction companies
Owner of initiative	Organisation: Partnership of Latvian Constructors
Type of initiative:	Sector-wide
Risk(s) addressed:	Overall management; heavy lifting; personal protective equipment risks; risks when moving cargo; risks in working with mobile equipment; risks when repairing machinery; electrical safety risks; risks during excavation; risks while working at height; chemical safety risks; fire risks on site; risks working indoors; physical health risks through manual work; post-accident handling.
Type(s) of intervention	Training videos, guidance material, knowledge sharing, consultancy, as an additional audio-visual informative tool and a part of construction trainings.
When was initiative implemented (at company)	From 17.12.2018 – permanent
Cost elements of the measure:	• Estimated time to implement: 6 months (initially) work lasted for 1 year; • Estimated amount of costs for the company– no additional costs, OSH specialist's salary (undisclosed).
Funding or support received from initiative	The support from the company – indirect, which includes the salary of the designated OSH specialist and the time spent on the development and the production of the video series.

Other measures

Other measures the company employs to mitigate the financial impact of accidents without actually reducing the accident rate are:

- Annual health check-ups;
- Intensive staff trainings and instructions, including specific trainings for each of the construction staff members depending on their specialization;
- Provided customized PPE;
- Construction project monitoring;
- Engaging additional OSH risk outsourcing companies.

Regular construction site monitoring and protocoling is established, the data is accumulated to provide the level of safety for each of the construction sites.

13.4 Observed impacts of the measures

It is difficult to provide the exact costs of work related accidents as there have not been serious accidents or accidents in general in the past years. As the successful prevention work by the company and the OSH specialist is being implemented – each employee working on the site or in project is provided with health insurance that covers most health related costs, and each of the employees is provided with specialised PPE, all of the staff receives adequate training and instructions before the launch of a new construction project as well as during the construction - a site construction and OSH monitoring takes place regularly.

13.5 Costs and benefits identified in financial framework

Cost element	Cost	
Weather exposure:	Outdoor shower or ventilator - (one item per 5 workers assumed)	€ 600
High voltage equipment / burners	Safety goggles + gloves combined	€ 150
Inhalation, swallowing	Breathing mask, 2x per year for 10 years	€ 1,200
Falling from ladder	2 safety clamps, extra support for ladder	€ 500
Falling from scaffold	Handrails, telestabilisator, safety clams, corner clams	€ 1,980
Falling objects	Safety helmet	€ 200
Hit or trapped by (rotating) tools	Motion sensor switch system; 1 tool per worker	€ 60
Tripping or slipping	Steel-shod safety shoes	€ 150
Short/low-intensity noise/light/radiation	Earplugs	€ 16
Long/high-intensity noise/light/radiation	Noise reduction barrier, one investment per 5 workers	€ 900

14 Latvia – Undisclosed company

14.1 Company profile

Company profile		
Company name:		Undisclosed
Company size (Number of employees):		158
Currency		Euro
Type of employees		Chairman of the board, administrator, head accountant and accountant, economist, accountant, labour organization engineer, technical director, geodesy engineer, construction department manager, builders, construction managers and assistants (road construction and asphalting), brigadier, road master assistant, road construction worker, asphalt laying machine operators, foundation and asphalt roller drivers, excavator driver, bulldozer driver, tractor driver, motor grader, truck driver, tow truck driver, cutters operators, asphalt concrete technician, production equipment mechanic in asphalt concrete plant, laboratory manager, at the plant - crushing operators, technician, building materials plant manager, specialized vehicle drivers - dampers, pitchers.
Type of work		Construction of roads and motorways
Member State of establishment:		Latvia
Operation in other EU MS:		Latvia
Dedicated OSH Officer		Yes, one fulltime OSH officer.
Estimated annual expenditure on OSH		Undisclosed information
Estimated time since last …	… major accident	Never
	… minor accident	5 years
	… near miss incident	1 year

Construction sub-sector	Tick applicable boxes
F41.2 – Construction of residential and non-residential buildings	☐
F42.1 – Construction of roads and railways	☒
F42.2 – Construction of utility projects	☐
F42.9 – Construction of other civil engineering projects	☐
F43.1 – Demolition and site preparation	☐
F43.2 – Electrical, plumbing and other construction installation activities	☐
F43.3 – Building completion and finishing	☐

14.2 Background information

Outline of company OSH policy

The company`s OSH specialist is generally responsible for reaching the safety objectives as well as implementing the OSH measures, initiatives and trainings. On the last Thursday and Friday of January every year, the staff has a variety of annual training sessions - first aid training, road traffic

regulations, where industry professionals are invited. Of course, there are in-house trainings with presentations, error demonstration and good practice examples as well as experience from the seminars provided by the SLI (State Labour Inspectorate) and the Riga Stradins University Institute of Occupational Safety and Health.

The company has developed, implemented and regularly updated and improved the quality management system according to ISO 9001 requirements. The company is proud to have professional, knowledgeable and skilled employees, who use their potential to achieve their goals, are the company's main asset and success factor. The company works diligently to improve the working environment to avoid accidents, injuries, occupational diseases, accidents and to reduce the impact of imminent work environment risks.

Daily work and operations of the company are organized to provide the customers, partners and the public with products and services that meet their needs and requirements, which they are of high quality and safe for use throughout their production and service life. Special attention is paid to mastering new technologies and using advanced materials as well as focusing company-driven processes on achieving the intended results by identifying, balancing and meeting the needs and desires of all stakeholders - customers, shareholders, employees, partners and the public. The company highly values successful cooperation with partners while planning, cooperating and during the construction works. The company is consistently in compliance with all applicable laws and regulations in the building industry in Latvia, to comply with standards, specifications, building codes and other requirements to which the Company has committed itself. The Company uses resource-saving working methods as much as possible, organize the recycling, and reuse of materials taking into account environmentally friendly work methods.

Motives for OSH prevention

There are 4 important motives that are essential for the OSH prevention in the daily work:

- Safety of workers;
- Company reputation;
- Quality of work;
- Lower costs of accidents.

Outline of risks

Most prevalent OSH risks in the company`s work are related to road accidents as majority of the work is done near heavy traffic objects. Also falling, slipping, tripping are some of the most common OSH risks due to the work near heavy machinery, in it`s so called 'black zone', for example, trenches, wells, etc. Furthermore, various chemicals propose a certain level of risks during works such as asphalt laying, double surface treatment; dust - silica (while working near mines or mineral plants). The last accident at the company occurred more than 5 years ago, therefore work accidents involving these risks occur in the company are practically non-existent.

14.3 OSH Initiative(s) profile

Awareness and use of sector initiatives regarding prevention measures on OSH

The company also took part in the creation of the OSH safety video material for companies that work in the field of construction and building that was launched on the December of 2018. The video was prepared and dedicated to the construction companies and construction workers to improve the occupational safety situation in the construction industry in Latvia. The team members participate in meetings with representatives of the State Labour Inspectorate regarding all the matters concerning OSH news, practices and initiatives. The company also has their own private

initiative – a training that is dedicated to work safety in specifically the road construction. This training addresses risks related to all of the work environment, including OSH-risk factors associated with road construction work - physical, ergonomic, chemical, dust and others. The initiative was launched at 25.01.2019, and was also supported and provided by the Riga Stradins University Institute of Occupational Safety and Health.

Initiative 1 profile	
Initiative name:	Work safety video series for construction companies
Owner of initiative	Organisation: Partnership of Latvian Constructors
Type of initiative:	Sector-wide
Risk(s) addressed:	Overall construction risk management; heavy lifting; personal protective equipment risks; risks when moving cargo; risks in working with mobile equipment; risks when repairing machinery; electrical safety risks; risks during excavation; risks while working at height; chemical safety risks; fire risks on site; risks working indoors; physical health risks through manual work; post-accident handling, etc.
Type(s) of intervention	Training, guidance material.
When was initiative implemented (at company)	From 17.12.2018 – permanent
Cost elements of the measure:	Estimated number of time to implement: 6 months
Funding or support received from initiative	No additional support.

Initiative 2 profile	
Initiative name:	Training: Work safety in road construction
Owner of initiative	The company herself
Type of initiative:	Private
Risk(s) addressed:	All work environment, OSH risk factors associated with road construction work - physical, ergonomic, chemical, dust, etc.
Type(s) of intervention	Training, knowledge sharing.
When was initiative implemented (at company)	25.01.2019
Cost elements of the measure:	• Estimated number of work-days to implement: 1 working day 09.00 – 15.30; • Estimated amount of costs: renting of the training premises costed € 159,00.
Funding or support received from initiative	Free training provided by the Riga Stradins University Institute of Occupational Safety and Health.

Other measures

Most of the local activities that have been established were virtually free, but the salary of the involved can be counted as an expense, then 20 construction supervisors and their assistants were paid for a 7-hour training period.

14.4 Observed impacts of the measures

In the year 2012, the company has certified the surface treatment manufacturing process according to the requirements of LVC EN 12271. Since the very beginning, the company has been very responsive to quality assurance issues and has regularly been highly ranked in the road industry for black pavement quality assessment on public procurement sites, topping the Top 3 companies every year or even receiving high performance marks. The company maintains a laboratory with qualified specialists and suitable equipment for the quality assurance and control of the construction works and products. The laboratory regularly participates in inter-laboratory comparative testing and produces good results. The company is constantly working on improving its production base. Office premises are being reconstructed and new production and repair facilities are being built or reconstructed to improve the work and general working conditions. The company has a warehouse at its disposal, a mechanical workshop and a technical repair base.

14.5 Costs and benefits identified in financial framework

Cost element	Costs	
Weather exposure:	Outdoor shower or ventilator - (one item per 5 workers assumed)	€ 150
High voltage equipment / burners	Safety goggles + gloves combined	€ 60
Skin allergy	2 arm protectors	€ 50
Inhalation, swallowing	Breathing mask, 2x per year for 10 years	€ 40
Falling from scaffold	Handrails, telestabilisator, safety clams, corner clams	€ 50
Falling objects	Safety helmet	€ 18
Pinching, hitting by shot away objects	Safety helmet	€ 15
Hit or trapped by (rotating) tools	Motion sensor switch system; 1 tool per worker	€ 15
Lifting, twisting, stepping	Stools, lifting tongs etc	€ 30
Tripping or slipping	Steel-shod safety shoes	€ 60
Short/low-intensity noise/light/radiation	Earplugs	€ 12
Long/high-intensity noise/light/radiation	Noise reduction barrier, one investment per 5 workers	€ 34

15 Latvia – ALFARENT Ltd.

15.1 Company profile

Company profile		
Company name:		ALFARENT Ltd.
Company size (Number of employees):		39 employees in total, including Alfarent Services Ltd.
Currency		Euro
Type of employees		The company employs various professional engineers – with higher education, secondary professional depending on the specialization.
Type of work		Construction equipment rental - providing scaffolding rental and assembly services.
Member State of establishment:		Latvia
Operation in other EU MS:		Latvia, EU
Dedicated OSH Officer		No. The OSH services are outsourced, working with Safety First Ltd.
Estimated annual expenditure on OSH		The OSH annual expenditure € 5,000 - € 6,000
Estimated time since last …	… major accident	Never
	… minor accident	2 years
	… near miss incident	Never

Construction sub-sector	Tick applicable boxes
F41.2 – Construction of residential and non-residential buildings	☐
F42.1 – Construction of roads and railways	☐
F42.2 – Construction of utility projects	☐
F42.9 – Construction of other civil engineering projects	☐
F43.1 – Demolition and site preparation (scaffold rental services – site preparation)	☒
F43.2 – Electrical, plumbing and other construction installation activities	☐
F43.3 – Building completion and finishing	☐

15.2 Background information

ALFARENT Ltd. is a full cycle scaffolding service company. Our goal is to provide our customers with optimum scaffold rental solutions, efficient use of facade and modular scaffold structures, quality assembly service, on-site delivery and comprehensive engineering support.

Company offers facade and modular scaffolding, masonry scaffolding, stair towers, movable aluminium towers, scaffold constructions for various applications. Scaffolding solutions designed by our engineers create safe work areas at any site. Design and assembly of structures is carried out in accordance with EU and LR legislation, strictly observing labour protection norms. ALFARENT Ltd. has a team of project managers, engineers and assembly supervisors are made up of qualified professionals with extensive experience in the scaffolding industry. The company constantly improves the employees' professional knowledge, and invests in the relevant OSH measures. The motto of the company is: UPWARDS, RELIABLE, STABLE AND SECURE, which is put into practice in the everyday work also regarding the quality of work, OSH measures and professionally.

Outline of company OSH policy

The OSH policy situation in the company is following - the manager of the company in general is responsible for work safety measure implementation in the company and is responsible for cooperation with the OSH outsourcing company Safety First Ltd.

The responsible persons designated by the order regarding the observance of occupational safety are: 1) Office - Responsible: Business Manager; 2) Warehouse - Responsible: Warehouse and Logistics Manager; 3) Installations - Responsible: Installation manager.

The ideal goal for the company would be to prevent any accidents form occurring generally. Therefore, we aim to implement safe and secure construction site preparation providing highest levels of scaffolding rental and assembly services. In addition to all of the legal requirements, ALFARENT Ltd. executes the following procedures:

- Regular OSH prevention visits to the sites where we carry out the work on the construction sites, twice a month, followed by a survey protocol including photo fixation. Every six months we hold a meeting where the situations of the surveyed objects are discussed and assessed;
- In the event of an incident or a near incident, we arrange a meeting, discuss the situation and re-instruct;
- The company has a system of internal sanctions, which mainly consist of work protection or OSH procedures and penalties.

Regarding more specific OSH measures or issues that might arise, the company outsources some of the professional and technical services to the company Safety First Ltd. that provides the most necessary OSH solutions, documentation forming, consultations and other forms of assistance. The OSH annual expenditure for the company makes up a sum around € 5,000 - € 6,000.

Motives for OSH prevention

The top-3 motives to participate in OSH prevention in the company ALFARENT Ltd. are:

- Safety of workers;
- Company reputation;
- Quality of work.

Outline of risks

The most current risks that the company is exposed to in the daily work are mostly due to the speciality of the services that company provides and they often are connected with the risk of work at height. They do work on sites where many companies are working at the same time, which is not always well coordinated therefore; there can be a working environment with many potential risk factors in place. Not all clients and site contractors treat work safety and OSH measures in the same way. For example, one construction site can have very high work safety requirements, and the other may lack OSH performance and comprehension, which has been a case observed in our work experience before. Incidents in the daily work of the company occur rarely as the last recorded minor accident took place two years ago when an employee injured his back as he had chosen wrong posture to lift a heavy object. No accidents have been recorded ever since.

15.3 OSH Initiative(s) profile

Awareness and use of sector initiatives regarding prevention measures on OSH

The initiative developed by the Partnership of Latvian Constructors on "Work Safety Video for Construction Companies" is a very good example and it is widely recognized and is well developed for prevention measures on OSH related issues in the construction field. The interviewee believes

that it should be free of charge for all companies working in the construction. It should have been more freely accessible and usable, thus promoting safe work on various construction sites. The initiative could be more useful for construction companies if more of its contents would be available free of charge.

Initiative 1 profile	
Initiative name:	Work safety video series for construction companies
Owner of initiative	Organisation: Partnership of Latvian Constructors
Type of initiative:	Sector-wide
Risk(s) addressed:	Overall management; heavy lifting; personal protective equipment risks; risks when moving cargo; risks in working with mobile equipment; risks when repairing machinery; electrical safety risks; risks during excavation; risks while working at height; chemical safety risks; fire risks on site; risks working indoors; physical health risks through manual work; post-accident handling.
Type(s) of intervention	Training videos, guidance material, knowledge sharing, consultancy, as an additional audio-visual informative tool and a part of construction trainings.
When was initiative implemented (at company)	From 17.12.2018 – permanent
Cost elements of the measure:	Estimated time to implement: 6 months - 1 year.
Funding or support received from initiative	No

Other measures

Other measures the company employ to mitigate the financial impact of accidents (without actually reducing the accident rate) is the guide “Guide to safe scaffolding’. This year an important OSH related activity of ALFARENT Ltd. has been established to promote safe scaffolding by developing and publishing the guide[85]. This guide is a useful and practical handbook for safe scaffolding for builders and scaffold assemblers.

The cost for the development of this safe scaffolding guide in our case was approximately € 1,000 as well as the additional work from our company. Regarding the costs and savings, the interviewee would not like to talk about savings related to the OSH procedures, because in Latvia it is very easy to save resources at the expense of work safety - without investing at all or investing very little. Which is not a good practice at all. In his view, the State Labour Inspectorate lacks resources and finances to adequately and properly control all of the construction sites. Correspondingly, many builders (including scaffold-hiring companies) save at the expense of work safety and OSH procedures.

15.4 Observed impacts of the measures

As mentioned before, the interviewee does not want to talk about cost savings, which are essential investments in job security and reputation in any company at least that is how it should be.

Regarding the benefits - they have broken the resistance of many employees and we are promoting the practice that working safely is good, stylish, modern, sustainable etc. The benefits are the

[85] https://alfarent.lv/content/files/DROSAS_SASTATNES_ROKASGRAMATA_30_10_2019(1.0.0).pdf

professional work that we do and good reputation as well as our employees who are working in safe environment and are very well equipped.

15.5 Costs and benefits identified in financial framework

Cost element	**Costs**	
Cost per worker of investment in safety equipment		
Individual protection for the employees	All Personal Protection Equipment - Workwear, Footwear, Goggles, Helmet, Anti-collision System, Gloves.	€ 300 per employee
Trainings	Training Courses - Working Indoors, Working at Height. First aid, Training of slingers.	Undisclosed
Benefit element	**Benefits**	
Individual protection for the employees	These requirements are compulsory by the law; therefore, it all has to be mandatory and provided for each employee.	No penalties. Employees feel good because they are fully equipped, cared for.
Trainings	Professional, knowledgeable employees.	The opportunity to work and professionally operate, receive orders in many complex construction objects.

16 Malta – Undisclosed company

16.1 Company profile

Company profile		
Company name:		Undisclosed
Company size (Number of employees):		340
Currency		Euro
Type of employees		The largest groups of workers are general construction workers, steel workers (known as shutterers) crane operators, drivers.
Type of work		Main contractor on almost all construction works
Member State of establishment:		Malta
Operation in other EU MS:		No
Dedicated OSH Officer		One full-time individual manages health and safety as well as data protection (80% of time on OHS). The company also subcontracts OHS services to a local OHS firm. The company also has about 15 workers that are designated OHS representatives (however these spent not much of their time on OSH).
Estimated annual expenditure on OSH		An overall figure is not available. However, it is estimated that in one year, € 52,000 was spent on training, € 48,000 on health and safety-related equipment such as PPE, and around € 30,000 on out-serviced health and safety consultancy. This adds up to a total € 130,000 but does not include the salary of the health and safety manager, maintenance costs, etc. There may also be overlap with the consultancy and training costs.
Estimated time since last …	… major accident	1 month
	… minor accident	1 week
	… near miss incident	1 week

Construction sub-sector	Tick applicable boxes
F41.2 – Construction of residential and non-residential buildings	☒
F42.1 – Construction of roads and railways	☐
F42.2 – Construction of utility projects	☒
F42.9 – Construction of other civil engineering projects	☒
F43.1 – Demolition and site preparation	☒
F43.2 – Electrical, plumbing and other construction installation activities	☒
F43.3 – Building completion and finishing	☒

16.2 Background information

Outline of company OSH policy

The studied company is currently going through a period of occupational health and safety (OHS) upheaval, with a new OHS manager appointed towards the beginning of 2019. A new OHS policy

has recently been produced; its main aim is to reduce accident rates. The policy does not have quantified objectives (nor did the previous policy). However, it is stated that reducing accidents and improving near miss reporting are the main objectives. The company aims to analyse their data following a period of a year to determine their success in meeting these objectives. Both objectives are seen as the responsibility of the CEO who would then be expected to delegate responsibility. The overall cost of OHS measures does not appear to have been quantified.

Motives for OSH prevention

The three most important motives driving OHS at this organisation are legislative requirements; the safety of workers; and the benefits brought about by a reduction in accidents. These are thought to include, reduced sick leave, reduced loss of production (due to reduced sick leave) and reduced turnover (at the moment a construction and economic boom is making it very difficult to find workers).

Outline of risks

The company is currently working on several construction projects simultaneously. The company takes care of all stages of construction, however it sub-contracts work depending on the internal skills available. Its data suggests that the three main risks are: slips, trips and falls; being hit by objects; and musculoskeletal disorders (MSDs). It was reported that slips, trips and falls of varying severity occur at a frequency of around one every 3 weeks, whereas being hit by objects of various level of severity occur at around a rate of once a month. The prevalence of MSDs are believed to be high; it is considered harder to determine when these occurred as they are often hidden and do not necessarily occur after a particular incident. The company does not keep a record of the cost of these incidents, however in the latest major fall, which occurred around a month ago when an individual fell off scaffolding, the organisation acknowledged that as a consequence the individual was yet to return to work, resulting in substantial absenteeism and greater workloads on the other workers. A lack of workers in labour market can often mean that injured workers are not replaced and often return to work as soon as possible; this is also driven by the workers themselves which are often foreign workers from disadvantaged countries which may be losing income through their absenteeism. Medical expenses are generally catered for by the country's public health service, rather than the company itself.

Other aspects of health and safety that the company is involved in include management that develop safe systems of work (rather than prepared from OHS personnel). It was estimated that the development of a single procedure was a couple of days work but did not result in extra costs as it was handled in-house. The company also organises OHS training of workers, mainly on induction, but also carries out ad-hoc toolbox talks. These tasks are often subcontracted to other OHS external consultants and may cost around € 250 per session. On average, employees receive 8 hours of training per year. The company reporting spending € 52,000 on training in a single year. The purchase of safety material such as personal protective equipment (PPE) and other related material was also seen as costly, with the yearly cost estimated at around € 48,000. The company also has two full-time workers (working a 40-hour week) who work on maintaining equipment. Maintenance is not carried out solely for OHS purposes. This was also not seen as an additional cost as it is carried out in-house. Certification of equipment, such as cranes, on the other hand, can be expensive when external consultants are hired. The cost of this varies dramatically depending on what external consultants are asked to certify. Finally, the organisation subcontracts OHS consultants to monitor OHS compliance within its worksites. Currently, such consultants provide a service of around 15 hours per week and can cost around € 2,500 per month. Thus, monitoring OHS compliance including conducting training, maintenance and the purchase of safety-related material were seen as major costs.

16.3 OSH Initiative(s) profile

Awareness and use of sector initiatives regarding prevention measures on OSH

It was described by the interviewee that the primary OHS initiatives known to the organisation were the skill card and informative seminars organised by the Occupational Health and Safety Authority (OHSA). The interviewee was not aware of the other identified initiatives, namely the MDA academy and 'Unions for Health and Safety'. It was mentioned that the workforce, which is increasingly being made up of foreigners (this is common throughout Malta where construction companies have expanded very rapidly in the last few years), is not unionised, and thus the latter was not considered relevant for the organisation. The organisation also carries out its own OHS initiatives, which are mainly training and information-driven, these are detailed in the boxes below.

Initiative 1 profile	
Initiative name:	Construction Industry Skill Card (CISC)
Owner of initiative	Building Industry Consultative Council
Type of initiative:	Nation-wide
Risk(s) addressed:	Improved awareness of general OHS principles relevant to construction. Beyond OHS, the card also aims to improve the quality levels of construction in Malta and formalise training
Type(s) of intervention	OHS component: Training
When was initiative implemented (at company)	Ongoing, initiated around 2 years ago.
Cost elements of the measure:	The cost to the organisation so far is € 600. No further information available.
Funding or support received from initiative	None

Initiative 2 profile	
Initiative name:	Seminars organised by OHSA
Owner of initiative	OHSA – government OHS authority
Type of initiative:	Nation-wide
Risk(s) addressed:	Various: the OHSA organise seminars, the topics of these vary. Some are specific to construction, such as crane safety, others are not but may still be applicable, such as psychosocial factors.
Type(s) of intervention	Training seminar – generally the aim is to improve awareness. Whilst these were not mentioned by the interviewee, the Authority also offers hard and soft copy resources via its website. Such resources may also be made available during seminars.
When was initiative implemented (at company)	Ongoing depending on the offerings of OHSA
Cost elements of the measure:	• Seminars are usually half-day, attended by a member of staff; • Seminars are free – as they are usually carried out during working hours, there is the cost of the attending individuals' salary.
Funding or support received from initiative	None – seminars are free

Initiative 3 profile	
Initiative name:	Provision of induction training and information
Owner of initiative	Interviewed company

Initiative 3 profile	
Type of initiative:	Private
Risk(s) addressed:	New workers are offered induction training. During this, OHS pamphlets are also given out. These tackle general OHS. These have also been supplemented by; provision of posters on-site (various languages to cater for foreign workers), tool-box talks and on-line mail shots delivered with workers' pay slips.
Type(s) of intervention	Training and guidance material
When was initiative implemented (at company)	Ongoing since 2019
Cost elements of the measure:	• Most information resources are prepared by the in-house OHS manager, sourced from free on-line resources. OHS induction training is often sub-contracted, and is approx. 2 hours long. Tool box talks are also often sub-contracted and are often 1 – 2 hours long. • Induction training session for around 20 workers and Tool box talks can cost the company around € 250 per session. Other costs are considered negligible (couple of hundreds per year) or are part of the company's payroll.
Funding or support received from initiative	No

Other measures

The company has insurance policies against third party damage and accident protection. The cost of this was not divulged.

16.4 Observed impacts of the measure

The studied organisation has not previously attempted to quantitatively measure the savings that health and safety measures may have resulted in. Attending OHS seminars was not believed to have resulted in direct savings, but were considered useful to improve awareness of legislative requirements (in so doing, this may have saved the organisation fines for non-compliance).

The organisation has been working to get some of its workers in line with the skill card requirements. Whilst the organisation was positive about the premise of this card, as it was hoped that the received training would result in safer behaviour, the organisation did not feel that this had resulted in any benefits yet. Conversely, whilst the organisation noted that Personal Protective Equipment (PPE) could be costly, it was believed that its benefits outweighed its costs. No data was available to back this up, however it was believed that accident rates, the severity of injury (when accidents occurred) and absenteeism would be higher without such equipment.

Beyond this, the organisation was not very optimistic that OHS measures resulted in much benefit. It was acknowledged that as OHS measures should reduce injury prevalence, and thus absenteeism, this would have a small positive impact on production. However, it was felt that OHS measures did not aid the organisation in completing projects in less time, in reducing idle time, or even reducing hiring costs due to less staff turnover. When asked if OHS measures aided in reducing absenteeism via reducing individuals' personal safety concerns, it was highlighted that construction was a dangerous occupation (as highlighted by the accident rate) and that individuals

worried about the risks could not afford not to come to work. This was thought to be exacerbated by the profile of the workers, who were often third country nationals who hailed from disadvantaged countries.

The interviewee was also asked to comment on the following tables. All numbers are based on perceptions. The estimated value is how much the measure contributed to accident reduction.

Measures	Measure taken?	Estimated value of reduction in accident probabilities
Procedures, handbooks, repair schemes	Yes	Unaware
Adequate size and sufficient time of crew	Yes	6 %
Training in safety competences (1 day every year)	Yes	50 %
Training in culture (motivation, alertness, priorities) - 1 day every 5 years	Yes	25 %
One-of awareness / basic safety training (1 day)	Yes	10 %
Work communication / cooperation (10 hours per worker every year)	No	
Safety material / equipment	Yes	50 %
Ergonomics (one-off check for posture during work)	No	
Medical check-ups and testing every 5 years	No	
OSH safety coordinator(s)	Yes	40 %

Did your company incur the following costs after an accident in the past two years and what is the average cost per accident?

Benefits (costs avoided)	Yes/no	Average cost per accident
Days of sick leave of victims	Yes	14 days
Lost hours of all colleagues of victim	Yes	2 hours (per worker)
Medical expenses	No expense - public	0 (money)
Repeated risk assessment	No	0 hours
Hiring of replacement staff	No for most accidents, done for the most severe accidents	0 days (if very severe accident, 15 days)
Administrative penalties	No	0 (money)
Penalty for late delivery	No	0 (money)

16.5 Costs and benefits identified in financial framework

The interviewee was positive about the concept of the framework. It was noted that encouraging OHS measures in construction in Malta can be difficult as these are generally viewed as a legislative requirement and often as a cost, whilst it was difficult to determine or convey any savings from OHS measures. On the other hand, the interviewee was very overwhelmed on viewing the framework and generally felt that it was very difficult to determine if the numbers were applicable to their organisation. It is worth noting that health and safety in the construction industry in Malta does not appear to be very data driven, although the culture may be slowly changing. For example, the studied organisation had only begun analysing accident data in 2019. This appeared limited to details of accidents; cost and benefits were not being analysed quantitatively or qualitatively. The

interviewee found it most easy to comment on the cost of purchases in terms of Euros. The interviewee believed that the framework covered all the possible costs and benefits.

The tables below contain the cost elements highlighted in the framework. Items that are missing from the included tables below are those where the incidence was 'no'. The interviewee felt that it was impossible to quantify or provide an estimate for the table on presenteeism (thus not included in below tables). In all occasions he felt that the statistics were possibly correct, in particular those where the productivity loss was temporary – 25% and when permanent – 50%. In terms of order of magnitude, the interviewee agreed that the greatest productivity loss occurred after more serious falls from height and machine accidents. The interviewee was unsure about the impact of mental tension on workers. It was agreed that electric shock, toxic substances, sharp objects and musculoskeletal stress could all result in presenteeism, with musculoskeletal stress a more common issue. Issues of heat, noise and light were seen as less likely causes of presenteeism.

Repeat extra training after accidents was not conducted at the studied organisation and thus these do not feature in tables below. Training was conducted at induction and ad-hoc via toolbox talks, these took between 1 and 2 hours. Finally, the organisation stated that they had not received any civil claims in the recent past and thus could not comment on the cost of these (as context, litigation in Malta appears to occur less frequently than some other countries, whilst court decisions can take several years. The following links from a non-comprehensive search highlight that court decisions regarding compensation in construction-related accidents occurred between 4 and 11 years after the accident, they also provide an indication of the sums paid out: 1, 2, 3, 4, 5, 6). Due to a lack of experience regarding litigation, this table is also not presented.

Cost element	**Costs**	
Cost per worker of investment in safety equipment		
High voltage equipment	Safety goggles + gloves combined	€ 40
Falling from ladder	2 safety clamps, extra support for ladder	€ 310
Falling from roof, platform, floor	Eaves protection (on investment per 5 workers assumed)	€ 1,020
Falling from scaffold	Handrails, telestabilisator, safety clams, corner clams	€ 2,040
Falling objects	Safety helmet	€ 75
Cutting	Knife with better handle	€ 10
Tripping or slipping	Steel-shod safety shoes	€ 50
Short/low-intensity noise	Earplugs	€ 20
Benefit element	**Benefits (accident costs that could have been avoided)**	
Low-voltage, exposure to weather	None	0
High voltage, burners	Lost electrical appliance or welding equipment	€ 2,500 – seen as a possible average but cost of equipment varies widely
Skin allergy	None	0
Inhalation, swallowing	Lost jerry can with substance	€ 500
Falling < 2.5m	Lost reform ladder	€ 300
Falling > 2.5 m	Rebuilding of scaffold, loss of tools	€ 5,100

Cutting	None	0
Pinching, hitting by shot away objects	Appliance shooting the object is lost	€ 500
Hit or trapped by machines / rotating tools	Machine repair	€ 2,000 – may vary widely depending on machine and if can be repaired inhouse
Musculoskeletal stress L/H	None	0
Noise / light L/H	None	0
Mental tension, stress, shock	None	0

17 Netherlands – Strukton Rail

17.1 Company profile

Company profile		
Company name:		Strukton Rail NL
Company size (Number of employees):		2500
Currency		Euro
Type of employees		About 2500 employees cover 1580 FTE's. There are about 500 employees support staff, 500 executive staff in safety (responsible for safety on building sites), and 1500 technicians (also executive staff and site workers).
Type of work		Main contractor on civil engineering projects related to railway construction.
Member State of establishment:		The Netherlands
Operation in other EU MS:		Belgium, Denmark, Sweden and Italy.
Dedicated OSH Officer		Yes, 13 fulltime officers
Estimated annual expenditure on OSH		Unknown
Estimated time since last …	… major accident	1 month to 1 year
	… minor accident	1 week to 1 month
	… near miss incident	1 week

Construction sub-sector	Tick applicable boxes
F41.2 – Construction of residential and non-residential buildings	☐
F42.1 – Construction of roads and railways	☒
F42.2 – Construction of utility projects	☐
F42.9 – Construction of other civil engineering projects	☐
F43.1 – Demolition and site preparation	☐
F43.2 – Electrical, plumbing and other construction installation activities	☐
F43.3 – Building completion and finishing	☐

17.2 Background information

Strukton Rail NL is highly intrinsically motivated to offer their employees proper, safe and healthy working conditions. They aim for their retirees not to retire on life when they leave the company but rather being able to enjoy their retirement instead, even if the job was physically demanding.

Outline of company OSH policy:

Strukton Rail NL invests quite a lot in improving the safety and health of their employees by offering mandatory training, developing safer working procedures, purchasing safety materials, improving the maintenance of equipment and monitoring compliance. Strukton Rail NL aims to minimize all accidents as much as possible, every major and minor accident is one too many. As such, every on-site employee receives at least 3 days of safety training a year and about 8 FTE's are devoted to developing and monitoring the training program.

Motives for OSH prevention

For Strukton Rail NL, all motives apply. However, the top 3 motives are:

- *Legal compliance.* Strukton Rail NL has to abide by the rules and regulation set by the Dutch labour inspection;
- *Safety of workers.* As mentioned, every employee should be able to physically enjoy their retirement after leaving the company at retirement age;
- *Other namely; intrinsic motivation.* Strukton Rail NL finds investing in OSH prevention very important.

Outline of risks

The most important risks for Strukton Rail are:

- *Risk of collision.* The latest incident of collision happened about one month to one year ago. Obviously, the most pertinent risk is that an employee is killed by colliding with a train while working aside the railway. Such accidents are considered as major accidents and luckily happen very unregularly, maybe once or twice a year (which is still considered as too often);
- *Electrocution.* Electrocution unfortunately happens quite regularly and is considered as a minor accident. Cases of electrocution happen every month;
- *Exposure to chemicals and a physically demanding working environment.* Exposure to dangerous chemicals and a physically demanding environment happens regularly. For quite a few employees, these risks are considered part of the job. Nevertheless, Strukton Rail aims to minimize these risks.

Although it is hard to say how much Strukton Rail spends on mitigating these risks, there are about 50 to 60 FTE's of work spend on health and safety measures such as training, developing work procedures, improving maintenance of equipment, etc.

17.3 OSH Initiative(s) profile

Awareness and use of sector initiatives regarding prevention measures on OSH.

Initiative 1 profile	
Initiative name:	Rail Alert
Owner of initiative	A collaboration of engineering companies.
Type of initiative:	Sector-wide
Risk(s) addressed:	Maintaining safety measures.
Type(s) of intervention	Training and guidance
When was initiative implemented (at company)	Unknown
Cost elements of the measure:	Unknown
Funding or support received from initiative	No

Initiative 2 profile	
Initiative name:	De Veiligheidsladder (The Safety Ladder)
Owner of initiative	Unknown
Type of initiative:	Nation-wide
Risk(s) addressed:	Dangerous working conditions.
Type(s) of intervention	Raising safety awareness and stimulating good behaviour.
When was initiative implemented (at company)	Unknown-permanent
Cost elements of the measure:	Unknown
Funding or support received from initiative	No

Initiative 3 profile	
Initiative name:	Heijmans Go!
Owner of initiative	Heijmans
Type of initiative:	Sector-wide
Risk(s) addressed:	The inability to communicate due to different nationalities of on-site workers.
Type(s) of intervention	The intervention arranges on-site workers who can translate between different languages.
When was initiative implemented (at company)	Unknown
Cost elements of the measure:	Unknown
Funding or support received from initiative	No

Other measures

There are other measures that the company employs to mitigate the financial impact of accidents without actually reducing the accident rate. These are:

- A health and safety management system;
- 13 full time OSH officers;
- Training course for new employees;
- Inspection rounds at the construction sites;
- Ongoing improvement of working systems on site;
- Private health insurance (employees get quicker treatment, which benefits the company);
- Work accident insurance.

17.4 Observed impacts of the measures

For Strukton Rail NL, it is very hard to say what the direct outcome of the measures are in terms of saved costs and gained benefits, the company does not monitor these.

17.5 Costs and benefits identified in financial framework

Cost element	**Costs**	
Cost per worker of investment in safety equipment		
Cost element 1	Outdoor shower or ventilator – (one item per 5 workers assumed)	€ 1.000,-
Cost element 2	Safety goggles + gloves combined	€ 100,-
Cost element 3	Breathing mask, 2x per year for 10 years	€ 1.000,- - € 1.500,-
Cost element 4	Handrails, telestabilisator, safety clams, corner clams	€ 2.000,-
Cost element 5	Safety helmet	€ 25,-
Cost element 6	Knife with better handle	€ 200,-
Cost element 7	Camera system and tags on clothes to warn drives about nearby persons (one investment per 5 workers assumed)	€ 5.000,-
Cost element 8	Motion sensor switch system; 1 tool per worker	€ 100,-
Cost element 9	Stools, lifting tongs etc	€ 1.000,-
Cost element 10	Steel-shod safety shoes	€ 250,-
Cost element 11	Earplugs	€ 150,-
Cost element 12	Noise reduction barrier, one investment per 5 workers	€ 1.000,-

Benefit element	**Benefits**	
Benefit element 1	Reduced accidents	Difficult to quantify.
Benefit element 2	Reduced absenteeism	Difficult to quantify.

18 Poland – ROMA BUD

18.1 Company profile

Company profile		
Company name:		ROMA BUD
Company size (Number of employees):		40-50 employees
Currency		PLN
Type of employees		Construction workers and 4 people in admin and finances
Type of work		Currently mostly subcontractor but slowly starting as main contractor too
Member State of establishment:		Poland
Operation in other EU MS:		Question not reflected in interview questionnaire therefore no data
Dedicated OSH Officer		Not as permanent staff
Estimated annual expenditure on OSH		Question not reflected in interview questionnaire therefore no data
Estimated time since last …	… major accident	5 years
	… minor accident	1 month
	… near miss incident	Interviewee is with the company only since January so his knowledge doesn't go beyond that.

Construction sub-sector	Tick applicable boxes
F41.2 – Construction of residential and non-residential buildings	☒
F42.1 – Construction of roads and railways	☐
F42.2 – Construction of utility projects	☐
F42.9 – Construction of other civil engineering projects	☐
F43.1 – Demolition and site preparation	☐
F43.2 – Electrical, plumbing and other construction installation activities	☐
F43.3 – Building completion and finishing	☐

18.2 Background information

The company has been prompted to increase their investment in OSH through being selected as subcontractor of ERBUD (one of the signatories of Porozumienie dla bezpieczenstwa w budownictwie / Agreement for Safety in Construction Industry). ERBUD, as leader of the above mentioned initiative set to push for higher OSH standards among all of their subcontractors and majority of the additional measures (those not required by the Polish law) introduced by ROMA BUD are in response to the requirements set by ERBUD.

Outline of company OSH policy

There is not comprehensive OSH policy document identified. The informant for this case study (a construction manager) has been with the company since January 2019 during which time he worked at two construction sites where Roma Bud was a subcontractor. The first contract was for a contactor not involved with Porozumienie dla Bezpieczenstwa w Budownictwie while the second one was for ERUBD-signatory to Porozumienie. Based on this experience, he was able to elaborate on the OSH improvement in the company resulting from collaboration with ERBUD.

Overall, the interviewee (who also has experience in construction business in Belgium) stated that the changes and improvements in OSH resulting from ERBUD / Porozumienie have been significant and had huge impact on the safety levels. He also observed 'spill over effect' within the company where standards that were improved in response to the requirements set by ERBUD were further expanded to construction sites where Roma Bud is working for other companies and starting as contractor itself. There are no quantitative targets set at the company.

Roma Bud does not have a dedicated OSH officer (as generally no companies of this size would in Poland). OSH responsibilities are divided between the owner who is responsible for purchases and contacts with contractors and the construction manager who dedicates approximately 10 to 15 percent of his time to OSH. Within the framework of contract with ERBUD, there is ERBUD's OSH officer present at the construction site daily overlooking procedure implementation. This is however a person external to Roma Bud and specific to this contract. Additionally, as stipulated by the contract, Roma Bud pays an external OSH specialist who visits the construction site once in two weeks to overview the work.

Motives for OSH prevention

The top-4 motives to participate in OSH prevention:

- Legal compliance;
- Safety of workers;
- Quality of work;
- Meeting high OSH standards set by ERBUD.

Outline of risks

The most significant risk in terms of severity the company reports is the one of workers falling from scaffolds, floors, ladders, balconies, or heights. There has been one accident of this sort reported when two years ago a worker fell down from a balcony which resulted in skull fracture. The worker was absent from work for one year as a result. Informant for the interview was not able to comment on the cost associated with the accident but it most likely included cost of Labour Inspectorate visit and review as well as training for all the workers. A risk of collisions with machinery or being hit by machinery was reported however no actual accidents of this sort were recalled. Same applies to accidents involving electricity or electric shocks.

In the summer period, extra care has to be paid to risk associated with working in heat and heat strokes. Additional breaks are mandated and depending on the temperatures (over 30 C) works ends at 2pm. Cooled water is provided to the workers. Reduction of work efficiency due to overheating was estimated at 10 percent.

In terms of frequency the most common accidents include minor cuts, musculoskeletal stress and foreign objects in the eye. Skin reactions due to contact with cements were also reported. In case of minor cuts, workers would continue working the very day of the accident having their wounds attended at the construction site so there have been no substantial costs associated other than temporary reduction of efficiency (estimated at 2-2%). It was estimated that such accidents take place weekly. In case of skin reactions to cement contact, reduction of efficiency was reported at 30 percent. No data on frequency was obtained.

Musculoskeletal stress is very common and it was reported that workers can remain at work up until spine pain reduced their work effectiveness by 25 percent. If percentage is higher than that, they would take a sick leave. Average length of such leave was estimated at six working days. Foreign

objects in the eye were common before new helmets with integrated googles were purchased. They would not require days off from work.

18.3 OSH Initiative(s) profile

Awareness and use of sector initiatives regarding prevention measures on OSH

The only initiative the interviewee was aware of, was the one impacting the company. Known as 'Porozumienie dla Bezpieczenstwa w Budownictwie' (The Agreement for Safety in Construction). This initiative is a collaboration of main contractors in construction industry operating in Poland launched in 2010. Signatories include foreign and Polish companies: Skanska, ERBUD, Warbud, Strabag, Mostostal Warszawa and several more (twelve in total). It also has three affiliated companies. The initiative has been endorsed by majority of national institutions and bodies active in the field of OSH, labour standards and health as well as key construction industry professional stakeholders. The mission of the initiative is 'to reduce the number of accidents in the construction industry through promotion of safety culture, raising awareness about dangers present at the construction sites, and prevention of accidents and risks[86]. There are five priority aims / areas identified: qualified labour force; OSH training, subcontractors, risk management and OSH culture. The last one is addressed through annually organized 'Week of Safety in Construction Work'.

This is achieved through a number of activities:

- Trainings;
- Certifications of skills gained through practical work in the construction industry;
- Risk management;
- Overall collaboration in the construction process evolving among the contractor and the subcontractor.

The initiative has developed a rich base of materials, checklists and safety standards and procedures which are available through their website to any company interested and which are in good part mandatory for the subcontractors employed by any of the companies-signatories. The company analysed for this case study was impacted by the initiative through its work as subcontractor of one of the signatories- ERUBUD.

Initiative profile	
Initiative name:	Porozumienie dla bezpieczenstwa w budownictwie
Owner of initiative	Large companies- industry leaders (12)
Type of initiative:	Nation-wide
Risk(s) addressed:	General OSH in construction industry
Type(s) of intervention	Training, guidance material, knowledge sharing, consultancy, monitoring of OSH standards at subcontractors, provision of safety equipment, sets of standards subcontractors need to meet in order to be employed by individual companies
When was initiative implemented (at company)	From October 2018 until present
Cost elements of the measure:	2 work days (2 company employees attending one day training)

[86] http://www.porozumieniedlabezpieczenstwa.pl/o-nas.html

Initiative profile	
Funding or support received from initiative	Yes. Free training, materials, dedicated OSH specialist overviewing works at the construction site every day, availability of machines increasing safety of workers.

Other measures

No other measure have been identified. All the measures have been introduced either to comply with the law or to comply with requirements introduced by the contractor / initiative.

18.4 Observed impacts of the measures

There has been significant impact of the initiative reported. As a result of being subcontracted by ERBUD (signatory of the initiative), the company has:

- Employed an external OSH specialist who visits the construction site be-weekly to review procedures and availability of safety equipment and materials. This measure has positively contributed to OSH habits of workers and managers. Specialist brings along some printed materials on the OSH issues which proved to be educative. There has been no data available on how much is the specialist paid by the company;
- Company has purchased better and more expensive helmets with integrated googles and under-chin strips. This measure has significantly improved work efficiency and reduced minor accidents. Previously workers had separate googles and helmets and would often misplace the googles. As a result they would lose time trying to locate them. If they were not able to locate them, many workers would continue working without googles and end up with minor eye injuries. Similarly, the only major accident that was recalled involved falling down from balcony without a helmet on. This resulted in skull fracture which could have been avoided with the new helmets in use. Cost of the new helmets: 54 PLN per piece. They were initially purchased only for the workers at the construction site contracted by ERUBUD but soon it became evident that it is a good investment and helmets were ordered for all the workers at the company. The overall number of eye injuries has dropped drastically and since June only one day was taken off by one worker due to minor accident;
- More stable and safer ‘Pharaon’ ladders were purchased (two pieces, each serving 10 people). They have additional stability feature which helps against sliding. This has proved especially useful during winter when ice contributes to slipping. This has been judged as allowing workers more effective work, without fear of slipping;
- One day training organised by ERBUD and delivered by employee of the National Labour Inspectorate. The training was dedicated to the issue of OSH regulation in collaboration between contractors and subcontractors. It was attended by two staff members from the company. It was judged as a useful instrument for better understanding the relationship between two entities regarding OSH. Since daily rate for one worker is estimated at 175 PLN and training was attended by two staff members, cost to the company is estimated at 350 PLN;
- Other measure includes ongoing presence of the ERBUD OSH officer at the construction site. This comes at no cost to ROMA BUD and is reported as huge advantage. For instance, OSH specialist controls if every worker is wearing adequate shoes and clothing. To this end, the company decided to collectively purchase S5 shoes (enforced with metal protection). While this per se is required by the Polish law, it is ERBUDS supervision that has motivated ROMA BUD owner to purchase the shoes for all the workers as to make sure they all have them. In parallel, at other construction sites, workers take responsibility for purchasing / having those and often they do not wear them;

- ERBUD has also eliminated a very dangerous current practice at construction sites in Poland- employing cheap labourers from Ukraine who lack adequate training and health checks. This 'phenomenon' has overall led to many accidents in construction industry in Poland, many of which go unreported as Ukrainians are employed illegally, without health insurance and companies fear fines in time of accidents. ERBUD / the initiative has very rigorous requirements and controls of all the certificates (health and professional) that must be provided by each of the workers employed by their subcontractors. Entry to the construction site leads through a gate which can be opened by workers' individual cards. If any of certificates are missing, worker is not able to enter the construction site;
- There is a number of cameras installed at several locations at the construction site and this contributes to overall sense of control and is reported to reduce worker's temptation to do something faster and overlook some of the OSH procedures;
- ERBUD has provided ROMA BUD with ALSIPERHA system which is expensive equipment (it was reported that SME hardly ever own it) increasing significantly safety of the workers;
- As a result of the overall emphasis on safety of the workers introduced by ERUBUD, Roma Bud has come up with its own small initiatives to improve OSH. One example includes short training or demonstration of safe lifting of heavy objects. This was carried out by the site manager once he realised that many workers were lifting heavy objects without bending their knees and as a result ending with hurting backs. This measure took very short time and its implementation has later been monitored by the site manager. As a result, fewer workers were complaining of hurting spine.

Measures	Measure taken? (Yes or No)	Estimated value of reduction in accident probabilities
Procedures, handbooks, repair schemes	Yes	31%
Adequate size and sufficient time of crew	Yes	Unable to assess
Training in safety competences (1 day every year)	Yes	20%
Training in culture (motivation, alertness, priorities) - 1 day every 5 years	No	Unable to assess
One-of awareness / basic safety training (1 day)	Yes	10%
Work communication / cooperation (10 hours per worker every year)	Yes	70-80%
Safety material / equipment	Yes	15-20%
Ergonomics (one-off check for posture during work)	Yes	15%
Medical check-ups and testing every 5 years	Yes	5%
OSH safety coordinator(s)	Yes	80%

18.5 Costs and benefits identified in financial framework

Cost element	Costs	
Cost per worker of investment in safety equipment		
Falling from roof, platform, floor	Good quality 'Pharaon' ladder (with extra stabilisation)	Cost per one ladder is approximately 1,000 PLN and it is expected to

		serve 10 people. They have two ladders currently.
	Good quality helmet with integrated googles and chin clap.	Helmet is 54 PLN each
Cutting	Good quality knife with handle	22 PLN each
Short/low-intensity noise/light/radiation	Earplugs	2.5 PLN a pair
Benefit element	**Benefits**	
Benefit element 1	Increase in efficiency	10-20 %
Benefit element 2	More projects / less idle time	6-7 %
Benefit element 3	Lower absenteeism	30 %
Benefit element 1	Reduced hiring cost due to staff turnover	70 %

19 Poland – Undisclosed company

19.1 Company profile

Company profile		
Company name:		Undisclosed
Company size (Number of employees):		400 of which around 100 are management and admin staff and 300 are production workers
Currency		PLN
Type of employees		Production workers, production of construction pre-fabricates
Type of work		Producer of prefabricated construction materials
Member State of establishment:		Poland
Operation in other EU MS:		No
Dedicated OSH Officer		Yes, two full time OSH officers and one contracted part-time
Estimated annual expenditure on OSH		It was not possible to estimate these
Estimated time since last …	… major accident	2 years
	… minor accident	1 month
	… near miss incident	1 month

Construction sub-sector	Tick applicable boxes
F41.2 – Construction of residential and non-residential buildings	☒
F42.1 – Construction of roads and railways	☐
F42.2 – Construction of utility projects	☐
F42.9 – Construction of other civil engineering projects	☐
F43.1 – Demolition and site preparation	☐
F43.2 – Electrical, plumbing and other construction installation activities	☐
F43.3 – Building completion and finishing	☒

19.2 Background information

Outline of company OSH policy

The company's OSH policy has two main components: strong OSH dedicated unit (comprised of three officers engaged exclusively with OSH activities) and ad hoc decisions, new OSH protocols and production adjustments based on identified needs. There are no long-term strategic targets or goals identified. Rather, the approach is needs-based and follows ongoing monitoring, communication between OSH officers and production team leaders and introduction of safety modifications when needed. The OSH unit is responsible for the overall fulfilment of OSH standards while the company's owner and the board overview the processes. OSH situation at the company is reviewed on annual basis through a comprehensive report containing statistics of accidents and sick leaves, risk assessments and identified needs for further improvements. Report is created by the OSH unit and submitted to the board. The report does not have financial analysis of costs and benefits. It was discussed that such analysis while potentially useful would be very difficult to elaborate. In general OSH related activities are divided amongst four stakeholder units:

- The Board: giving general directions and overviewing OSH compliance overall;
- OSH Unit: monitoring and reporting on OSH activities and compliance; provision of training to the workers and daily monitoring of safety;

- Team leaders/supervisors at the production lines: monitoring that workers adhere to OSH protocols and standards.

Motives for OSH prevention

The top-3 motives to participate in OSH prevention:

- Legal compliance;
- Safety of workers;
- Quality of work.

Outline of risks

No estimates of costs were provided and this would require revealing of wages for which OSH officer interviews was not authorised.

There are four types of main risks identified:

- *Falls from heights*. Falls from heights above 1 meter are not common (one took place some three years ago) while those from under 1 meter take place 1-2 times a year. Severity varies but in general those result in minor fractures and bruises. The principal cost of incidents is sick leave for the injured. It is not likely that new workers are employed as replacement but if the injured worker was assigned to a project/order considered priority then colleague from less urgent task will be temporarily re-assigned as replacement;
- *Injuries caused by movable parts of machines.* Here severity varies but these accidents are overall considered more severe and costly as they require quick evaluation of the machine and possible temporary closing of the production line (most likely for a few hours). If it is established that there is a safety gap regarding a machine or several machines, risk assessment follows which can lead to major adjustments;
- *Collisions with mobile machines*. Frequency was not established but these would largely concern workers being hit by moving vehicles so the cost incurred has to do with sick leave rather than machine fixing;
- *Cuts by sharp objects*. These vary greatly in severity but commonly are minor, leading to minimal work detours of impacted workers (first aid application, change of protection uniforms). Seldom cuts may result in infections which lead to longer treatment. Frequency is estimated as monthly.

The overarching problem identified at the company was poor rate of safety culture amongst the workers. It was stated that while all the necessary protective equipment and materials are readily available to the workers, many fail to use them. This is especially the case with protective helmets. As such, while ensuring that workers use protective equipment is the primary responsibility of team supervisors, the OSH officers randomly visit different sections of the production lines to monitor usage of protective equipment and to encourage workers to adhere to safety standards.

An important aspect of the company's approach to safety concerns visits of the contracted parties or service providers at the plant. It is acknowledged that due to significant presence of machinery, including cranes and transport of materials above the heads as well as great number of various transport machines, the plant is especially dangerous to people not familiar with its operations. For this reason, special safety protocols and contracts have been developed for any outside workers carrying out work at the company.

19.3 OSH Initiative(s) profile

Awareness and use of sector initiatives regarding prevention measures on OSH

OSH officer interviewed for this research acknowledged that although he is aware of some sector initiatives, none have been directly implemented at the company. He was not able to elaborate on why this has been the case.

Three specific initiatives were mentioned:

- 'Porozumienie dla bezpieczenstwa w budownictwie' (described in detail in the first case from Poland). This initiative would not directly impact the company as it is a production company, not a subcontractor;
- Funds for improvement of OSH standards at the companies made available by ZUS (Zaklad Ubezpieczen Spolecznych/National Social Security);
- The OSH officer took part in first aid trainings financed by the City of Wroclaw. These were not specific to construction sector though, but they inspired greater concern with the overall first aid preparedness at the company and led to purchase of a defibrillator.

Initiative profile	
Initiative name:	Co-financing of ZUS's payers activities in OSH-competition
Owner of initiative	Zaklad Ubezpieczen Spolecznych (ZUS)
Type of initiative:	Nation-wide
Risk(s) addressed:	Broad range: safety of technical installations, machines and work places; protection from noise, electromagnetic risks; protection from optical radiation; protection from electricity, air pollution, protection during works on heights and in cavities/depressions; protection from chemical substances and musculoskeletal stress.
Type(s) of intervention	Financing for purchase of protective equipment and materials.
When was initiative implemented (at company)	No
Cost elements of the measure:	Not available
Funding or support received from initiative	No

Other measures

Other measure that the company employs to mitigate the financial impact of accidents without actually reducing the accident rate is 'group health insurance'. Their own workers can join the private group insurance scheme co-financed by the company. No information can be shared on the cost of the group plan.

19.4 Observed impacts of the measures

There was no estimation of direct impact provided but it was interestingly noted that a significant decrease in number of sick days and reported accidents can be observed between 2017 and 2018: there were 33 accidents reported at the company in 2017 and only 19 in 2018. This reduction has not been attributed to any specific measure, but it could be argued that experience gained in OSH overall has contributed positively.

In case of this company where large, complex production lines are used (combination of several large machines with different elements), any major accident and repeated risk assessment would potential equal to substantial costs. Therefore efforts are invested in ongoing monitoring of production safety and prevention.

A new significant challenge has been noted in the light of introduction of GDPR in regards to safety protocols for outsourced / contracted workers. While the company continuous to implement OSH protocols and contracts with external workers, due to introduction of GDPR it can no longer request proofs of all the necessary medical check-ups and completed training and it has to rely on contracted firm's assurance that its workers fulfils all the requirements.

19.5 Costs and benefits identified in financial framework

Cost element	Costs	
Modernisation and adjustment of production lines	Changes and improvements in machines / work environment and work protocols (purchase of protective elements, closing of line production for the time of modernisation; time spent by OSH officers and engineers for elaboration of modernisation / adjustment plans; possible additional training)	No data available but these could be significant as the production lines as complex and works (including risk assessment, elaboration and implementation could take up to months)
Purchase of protective equipment and materials	Purchase of helmets, gloves, earplugs, etc.	No data available on specific prices as these are considered confidential business arrangements with suppliers
Training	OSH training of new employees; periodic OSH training of all the workers (few hours, annual); additional training following accidents.	No data available
Ongoing monitoring of OSH adherence amongst the workers	OSH officers visiting production line every day to ensure workers wear protective equipment and follow safety protocols	No data available

20 Slovakia – EUCOS SK, s.r.o.

20.1 Company profile

Company profile		
Company name:		EUCOS SK, s.r.o.
Company size (Number of employees):		450
Currency		Euro
Type of employees		50 employees + 400 self-employed (contracted for various lengths of work (from several weeks to several months) during the year 2018. Professions of employees are: Construction Production Manager, Security Technician, Construction Master, Fiscalist, Accountant, Personnel and administrative management, Warehouseman and supply. Professions of self-employed: Workers - to perform construction activities.
Type of work		Main contractor or subcontractor on most construction works including Mochovce Nuclear Power Plant and US Steel Košice.
Member State of establishment:		Slovakia
Operation in other EU MS:		No
Dedicated OSH Officer		Yes 5 persons. They work 95 percent of working time for OSH within EUCOS
Estimated annual expenditure on OSH		€ 20,000 per year approximately
Estimated time since last …	… major accident	Never
	… minor accident	
	… near miss incident[87]	

Construction sub-sector	Tick applicable boxes
F41.2 – Construction of residential and non-residential buildings	☐
F42.1 – Construction of roads and railways	☐
F42.2 – Construction of utility projects	☒
F42.9 – Construction of other civil engineering projects	☒
F43.1 – Demolition and site preparation	☒
F43.2 – Electrical, plumbing and other construction installation activities	☒
F43.3 – Building completion and finishing	☒

20.2 Background information

Outline of company OSH policy

EUCOS SK, sro Medzev has implemented the Integrated Management System (IMS), which consists of three components:

[87] Near miss': an incident that could have resulted in an injury or illness to people, danger to health, and / or damage to property or the environment.

- Quality management system according to ISO 9001: 2016;
- Environmental management system according to ISO 14001: 2016;
- Occupational Health and Safety Management System according to OHSAS 18001: 2009.

The occupational health and safety policy of the company contains plans whose basic objective is to ensure a safe and healthy working environment. At the same time, EUCOS shall take preventive measures to prevent the occurrence of adverse events, accidents or occupational diseases.

To fulfil these values, EUCOS performs:

- Supporting OSH management as a core value through the implementation of technological and manufacturing processes in a safe manner, emphasizing that responsibility for managing this OSH process rests from the level of individual employees to the management of the company;
- Delegate OSH responsibilities to all managers and executives;
- Integrate OSH management systems and processes as important elements in all areas of business;
- Require suppliers and external entities to carry out their activities with this OSH policy and in accordance with established OSH internal regulations.

The management of the company in close cooperation with the safety technician, fire technician and IMS manager is responsible for achieving the OSH policy objectives. They do not have precisely quantified objectives in the occupational health and safety policy, it is a declarative document.

Motives for OSH prevention

The top-3 motives to participate in OSH prevention:

- Legal compliance;
- Safety of workers;
- Quality of work.

Outline of risks

The major risks that the company faces are “falling from a height”, “cutting the limbs” and “eye damage”. However, EUCOS also faces other risks in its operations. It should be noted that these are all kinds of fall risks, but also “weather exposure”, “hit or trapped by machines” and “tripping or slipping”. As it is construction work (work at heights and above the depth, excavation, scaffolding and construction work), the most common risks are: falling from a height to a free depth, cutting the limbs, eye damage, exposure to inclement weather (cold and heat), endangering working machines and tools.

To prevent accidents, EUCOS ensures:

- Outdoor shower, air conditioning and heaters. Cost are € 750 yearly per 5 workers;
- Eaves protection, hand protection, horizontal belay system, anchor points, protective harnesses. Cost are € 1,500 yearly per 5 workers;
- Noise reduction barrier. Cost are € 600 yearly per 5 worker;
- Handrails, telestabilisator, safety clams, corner clams. Cost are € 200 yearly per worker;
- Safety helmet, protective nets, rope for clamping the device against falling. Cost are € 250 yearly per worker;
- Camera system and tags on clothes to warn drives about nearby persons. Cost are € 500 yearly per 5 workers;
- Stools, lifting tongs etc. Costs are € 200 yearly per worker.

EUCOS has contracted self-employed to perform the agreed work. According to the contract, they are responsible for their safety and health and safety conditions themselves. However, EUCOS has obligations towards customers (e.g. USS Košice) and therefore provides for self-employed contractors also some services in the field of OSH and these are mainly initial training, on-site briefing and verification of their knowledge. It also provides collective and personal labour protection through PPE. However, insurance against accidents at work and occupational diseases is provided by each self-employed person himself. EUCOS does not deal with possible investigation and compensation of work-related injury to self-employed persons.

At the end of the contract, self-employed persons have the option to purchase used PPE at discounted prices. The cost of PPE per worker depends on the type of work - easier manual work of about € 100 per worker, for more complicated jobs (work at height) it is € 200 to € 300 per worker. This also includes the costs of ensuring the maintenance of the PPE. The protection of workers against injury prevention is specific in the case of self-employed contracting. Self-employed are primarily self-help to ensure OSH and EUCOS complements measures for these workers, especially in the form of training.

The latest accident in EUCOS was about 10 months ago - fall from scaffolding, without serious consequences (crushing, hitting, and scraping the body). Fortunately, the injured worker was protected by a protective helmet and work clothes. Treatment required weekly incapacity for work.

20.3 OSH Initiative(s) profile

Awareness and use of sector initiatives regarding prevention measures on OSH

EUCOS makes use of sectoral initiatives on prevention of occupational health and safety at work relevant to EUCOS, such as training on current topics in the sector (summer months e.g. heat load, year-round e.g. dangerous work) and risks associated with specific construction work. Furthermore, EUCOS implements several safety activities, such as mandatory safety contacts, on-site inspections by a safety technician, and daily 5-minute security and safety interviews before starting work. Furthermore, EUCOS participates in seminars of security technicians of supplier organizations.

On a daily basis, EUCOS provides training (management procedures, office work), on a monthly basis provides training of employees in the form of briefing, and EUCOS ensures the development of work procedures, and purchases of OSH material as needed. Where appropriate and in the light of the comments, EUCOS provides review of RPM and management control activities. The cost of purchasing OSH material is estimated to be about 96 hours per year, for revisions of 150 hours per year, and for inspection activities about 960 hours per year. For other activities – including training, workflow development, etc. – EUCOS spends about 1255 hours per year. Especially for self-employed workers, EUCOS provides training and revisions with an estimated cost of around € 2,500 per year.

Initiative profile	
Initiative name:	Seminar for OSH technicians
Owner of initiative	EUCOS
Type of initiative:	Private
Risk(s) addressed:	Shortcomings, threats and risks that occur in the construction industry (either due to ignorance, but also due to incorrect approach to OSH on construction sites).

Initiative profile	
Type(s) of intervention	Training
When was initiative implemented (at company)	Regular activities once a month
Cost elements of the measure:	The estimated number of work-days to implement is 3 days. The estimated amount of costs is € 500
Funding or support received from initiative	Free training, information material is the only cost.

EUCOS SK s.r.o. provides its employees as well as self-employed workers with both internal and external trainings. These trainings are provided by EUCOS SK s.r.o. These are mainly trainings such as initial OSH training for newly recruited workers, recurrent OSH training after 2 years, as it results from Act 124/20006 Coll. o OSH. They re-train all concerned workers to a specific construction site about the safe work practices of the construction site (these documents are being developed by EUCOS), as well as safety plans, evacuation plans, site coordination and all OSH-related essentials before / on site. All training courses are registered through attendance sheets. Trainings such as gas protection, work with special electrical equipment, etc. (special training), for which EUCOS is not certified and qualified, are provided by external companies designated for this purpose, such as BeSoft, Hilti, SafeTime, etc. The OHS measures carried out by EUCOS also include the implementation of OHS audits on quality and environmental issues through TUV SUD, for which EUCOS is certified.

Other measures

EUCOS pays an obligatory accident insurance for employees. Cost and savings estimates are not available. EUCOS provides preventive medical examinations of employees in relation to work and recondition stays for employees' category no. 3 (noise exposure). Cost and savings estimates are not available.

20.4 Observed impacts of the measures

Thanks to care and health and safety costs, EUCOS has received several benefits:

- The estimated fewer near-misses (change in efficiency) is 10 percent;
- Lower absenteeism for personal safety concerns - about 5 percent;
- Less idle time between projects due to quality work - about 3 percent;
- Reduction of personnel recruitment costs due to less staff turnover - by around 15 percent.

Estimates of the contribution of the relevant accident reduction measures:

Measures	Measure taken? (Yes or No)	Estimated value of reduction in accident probabilities
Procedures, handbooks, repair schemes	Yes	50%
Adequate size and sufficient time of crew	Yes	70%
Training in safety competences (1 day every year)	Yes	30%
Training in culture (motivation, alertness, priorities) - 1 day every 5 years	Yes	5%
One-of awareness / basic safety training (1 day)	Yes	70%
Work communication / cooperation (10 hours per worker every year)	Yes	70%

Measures	Measure taken? (Yes or No)	Estimated value of reduction in accident probabilities
Safety material / equipment	Yes	80%
Ergonomics (one-off check for posture during work)	No	Unable to assess
Medical check-ups and testing every 5 years	Yes	50%
OSH safety coordinator(s)	Yes	90%

In the previous period, EUCOS did not record either the cost of presenteeism, the cost of repairing or replacing equipment, the cost of extra repeat training for all staff after an accident, or the cost of civil claims.

20.5 Costs and benefits identified in financial framework

Cost element	Costs	
Cost per worker of investment in safety equipment		
Purchase safety equipment and PPE	These are purchases of safety equipment and PPE in order to increase collective and personal protection of workers. Furthermore, it is the purchase of equipment that allows to improve working conditions when exposed to heat and cold when working in outdoor workplaces. These are various fans, heaters, water dispensers	Average € 250 per PPE per worker, per 5 workers one ventilation and heating device, per 10 workers a drinking water rack. Total cost approx. € 12,000 per year
OSH seminars	It is the organization of professional seminars for safety technicians, OSH coordinators on construction sites, are about 4 times a year on various issues in the construction industry.	€ 2,000 per year
Training of employees in the field of OHS	It is education of OSH for all employees. Initial training - initial briefing, periodic once and 2 years, when changing technology and purchasing equipment as is needed. They are performed by a safety technician.	€ 5,000 per year
Benefit element	**Benefits**	
Reduction of accidents, injuries and dangerous situations	Proper use of safety equipment and PPE reduces the risk of accidents and harms to the health of workers. Reducing exposure to heat and cold prevents illnesses of workers and their incapacity for work	Reduce the number of days of incapacity for work, reduce health care costs
Increase the professional knowledge and skills of workers	By properly setting the issue of professional seminars and training, employees will increase their expertise in OSH and can use them at work.	Unable to quantify

The money spent on OSH is quite high (approx. € 50,000 per year). The levy on accident insurance is also high. Bonus-malus is not applied in Slovakia, so even if the company strives to have a high quality of OSH and work environment, it is not sufficiently rated by the state. If there are fewer accidents at work and occupational diseases, there is less absence, lower production costs, a continuous production process without downtime. Reducing the number and severity of accidents at work requires less responsibility for incidents and reduces financial costs.

Annex 5: Minutes of the stakeholder meetings

EUROPEAN COMMISSION
DIRECTORATE-GENERAL FOR INTERNAL MARKET, INDUSTRY, ENTREPRENEURSHIP AND SMES

Transformation and advanced value chains
Clean Technologies and Products

Development of an EU framework to assess the overall impacts of occupational health and safety (OSH) prevention on the performance of construction enterprises

First Stakeholder Meeting – Mapping and Taxonomy 13th March 2019

Av. D'Auderghem 45 – 1040 Brussels, meeting room F. Braun/BREY, 5th floor

Minutes of the meeting

Stakeholder meeting of the EU project "Development of an EU framework to assess the overall impacts of occupational health and safety prevention on the performance of construction enterprises"

Ms Fulvia Rafaelli (Head of Unit, DG GROW C.1) opened the meeting by highlighting the construction sector's importance in dealing with many different challenges such as sustainability, quality of life and employment. The sector has a central role in addressing these challenges, but simultaneously is itself plagued by a skill shortage and poor public perception caused by tough working conditions. The stakeholder meeting and the project are part of address these two issues by contributing towards better occupational health and safety (OSH) in construction. The final aim of the project is to improve the implementation of OSH programmes by raising awareness among companies and by providing them with a practical framework to assess the benefits and costs of implementing OSH initiatives in their companies. In short: the goal is to make a better business case for OSH standards at work.

After this introduction, Ms Saraï Sapulete (Project Coordinator, Ecorys) took the floor. She shortly presented the project's aim, its tasks, the status of the work and an outlook on the subsequent steps.

First Presentation: A business case for safety and health at work
Before going more into details of the project, it is important to reflect on previous work in the area. Therefore, Mr Antonis Targoutzidis (Hellenic Institute for OSH) presented the results of a study on the business case for safety and health in SMEs[88]. The study consisted of a literature review and 13 case studies. Limitations to this approach are that the sample is based on availability, it does not allow randomisation and only positive cases are reported. Nevertheless, the study had very interesting findings. For one, OSH measures were not implemented for their economic benefits, but economic evaluations were important for measures that included larger investments. These evaluations are nonetheless complicated, since benefits are difficult to estimate. For example, accident probabilities are already low and any change in probabilities would not be very visible; however, any accident would hit an SME very hard. Moreover, health benefits show only in the long-term and their benefits are difficult to calculate. In addition, Mr Targoutzidis pointed out that in some countries with good insurance systems, companies already internalise OSH related costs via insurance payments, while in others costs remain external and fall onto social security systems. Overall, participatory and low budget interventions in companies with previously low OSH standards have the highest return of investment and the majority of measures identified related to ergonomics or musculoskeletal issues. This could be attributed to the fact that the results of such interventions start to show in the short term (reduced absenteeism) and the investments are usually "soft" and low budget, which allows for profitability (publication bias). An important conclusion of

[88] Available at: https://osha.europa.eu/en/publications/reports/the-business-case-for-safety-and-health-cost-benefit-analyses-of-interventions-in-small-and-medium-sized-enterprises/view

this study was the issue of economic benefits of the investment regarding productivity. Practically, no intervention is purely about OSH; productivity is also affected and the results in such studies are also coming from increased (non-OSH related) productivity. It is an issue of whether these benefits should be taken into account and whether we can talk about OSH interventions or interventions with an OSH component. Finalising his presentation, Mr Targoutzidis presented some of the analysed case studies from construction SMEs across Europe, which also highlighted again that the shortest pay-back period with the highest return of investment comes from small-scale training interventions by reducing absenteeism and increasing productivity, while larger-scale interventions that require buying new equipment take longer to pay off.

In the **discussion**, attendants overall appreciated the study and its findings, but had a few remarks:

- After questions by participants regarding the representativeness of the presented study, Mr Targoutzidis stressed again how the study, by presenting only few cases, is not be seen as representative but rather as **explorative** for further analysis.

- Mr Rolf Gehring (EFBWW) noted that for the sector description it is also important to mention the increase in ("bogus") **self-employment**, which is complicating the implementation of OSH standards, since it allows enterprises to outsource responsibility.

- Mr Dietmar Elsler (EU-OSHA) remarked that his agency is looking not only into costs and benefits for companies, but also into **societal aspects**. They are currently conducting a study that addresses what OSH related costs society bears.

- Mr. Kai Schäfer (German Ministry of Labour and Social Affairs) mentioned that the project faces considerable methodological challenges, which seem difficult to overcome. For example, it is unclear how the OSH initiatives were selected and whether all relevant ones were included.

- Mr Richard Habgood (ISHCCO) remarked that a French report (OPPBTP study[89]) showed that to get companies attention more easily it is important to focus on numbers and not percentages (e.g. for each Euro spent there was a return of x amount of Euro).

- As a final comment, Mr Targoutzidis reminded attendants that the return of investment is often exaggerated, since many costs avoided by OSH prevention actually would anyway be externalised by enterprises with society bearing the majority of costs from accidents and health impacts.

Second Presentation: Presentation of the mapping of OSH initiatives

Ms Sally Wilson (IES) presented the mapping of OSH initiatives[90]. For the mapping, the research approach was based on a first round of desk research, and a second round where country experts dug deeper to supplement the first findings. The second round is currently still ongoing for some EU Member States. The mapping tool uses a logic chain (aim – activities – outcomes) that reflects on costs and benefits in order to support Task 2 'The taxonomy of costs and benefits'. Currently, 107 OSH schemes have been identified representing all except five of the EU28. The type of schemes identified range from interventions in form of training and guidance materials over online tools and apps to certificates and accreditations. Approximately 30% of these interventions address specific OSH issues (e.g. falling from heights, manual handling of heavy loads), while 70% are general OSH interventions (e.g. awareness raising). One targeted initiative, -'Safer Sites/The Fork Lift Truck Association', UK - and one general initiative - 'Porozumienie dla Bezpieczeństwa w Budownictwa', PL- were presented to display how the mapping tool is actually applied. Concluding her presentation, Ms Wilson noted that logic chains are easier to define for specific (targeted) initiatives than for general OSH ones, since the desired outcome and instrument for change are clearer defined. Moreover, the main actors in these initiatives seem to be larger companies, while it is unclear

89 Available at https://www.preventionbtp.fr/Documentation/Explorer-par-produit/Information/Ouvrages/Une-approche-economique-de-la-prevention-D-apres-101-cas-etudies-en-entreprise

90 The draft mapping was shared with attendants prior to the meeting.

whether transferability or outreach to SMEs are considered. However, SMEs are potentially beneficiaries of accreditation or certification schemes that aim to create a level-playing field across the sector.

The following points came up during the **discussion** with the stakeholders:

- Mr Bernd Merz (BG BAU) remarked that talks about return of investment of OSH initiatives ignore the fact that many companies do not even comply with what is legally required. It would be beneficial to companies (in terms of savings) and workers if **compliance** can be increased, but a costs and benefits analysis will probably not prove very insightful.

- The importance of clear **guidance documents** for companies was also stressed in order to facilitate compliance with OSH standards.

- Mr Rolf Gehring (EFBWW) remarked that good OSH standards not solely depend on companies. Some things might need to happen at workplace or company level, but for others a wider **cooperation** across the sector is needed.

- Mr Matthias Fritz (DG EMPL B.3) added that **reputation** is an important factor to look into. A more risky job requires higher wages to attract workers. Companies might actually save costs by creating a safer work environment, allowing them to decrease the part of the wage which is necessary to compensate for the higher risks.

- An aspect often forgotten is **Presenteeism**. While studies look into the costs of absenteeism caused by bad health and injuries, productivity losses from working while sick or in poor health are not often considered.

- Mr Kai Schäfer (German Ministry of Labour and Social Affairs) stressed that it is problematic to focus on OSH measures being economically most advantageous for companies and not include OSH measures deriving from legal requirements which in some cases may be less advantageous for the company. This could give companies a false impression that they could restrict their OSH activities mainly to those which are economically interesting.

- In terms of **language**, it was also requested not to refer sub-contractors and contractors but to simply refer to every company working on-site as a contractor to address everyone uniformly.

- A **challenge** pointed out by Per Kristian Kastberg (Arbejdstilsynet), are the differences between the company focus of the project and the sector/state wide initiatives that are also part of the mapping. The contractors should avoid preparing a cost and benefit analysis that is diluted because it looks at OSH initiatives that are too different from each other. The consultants agreed that they would avoid aggregating costs and benefits across all collected initiatives and carefully categorise each collected initiative.

- Another challenge following from the above is that the comparison between costs and benefits for initiatives may be different, because benefits for companies may be higher in cases where the state pays for a large part of the initiative. This may impact the results, and may lead to a situation in which state funding will be promoted or necessary, while the aim should be that companies take up initiatives by themselves.

- Two similar **challenges**, mentioned by Mr Merz (BG BAU), relate to differences between countries and the differences in initiatives aiming at simple compliance by companies to existing laws versus initiatives going beyond that. The consultants are considering this and in general, the aim is to get a representative sample of schemes from all Member States, so that there is something relatable for everyone.

- Finally, the consultants **clarified** that the mapping is not the main outcome of the project, but it represents the preparatory work to create a financial framework with which companies can more easily assess their own costs and benefits for OSH initiatives. This

should show the benefits of such initiatives. Furthermore, the ultimate target audience of the framework (presented in a handbook) will be individual companies.

Third Presentation: Human Factors in Prevention: 'Build on safety. Build on yourself.'
After the lunch break, Mr Bernd Merz (BG BAU) presented an initiative of the German Social Accident Insurance for the building trade that looks into human factors on construction sites. He started by showcasing a positive trend in statistics on fatal and non-fatal accidents rates in Germany and the EU, but reminded everyone that there is still much room for improvement. Using data from Banks on the calculation of loan risks, he highlighted the relative low investment costs on OSH related measures compared to the high risks from lost work hours due to accidents. Past advances in OSH came from improvements in engineering, qualifications and organisation. BG BAU sees the next step in addressing human errors and social factors. Using available data from airlines, Mr Merz showed that social problems in teams increase the number of critical incidents by a factor of five. In construction, tension might be an even bigger problem due to having lots of different cultures, languages and small companies working on one construction site together. In order to avoid negative work environments, BG BAU prepared a Charta together with social partners that includes nine rules for the construction sector. This Charta is supported by individual company declarations that affirm the commitment of everyone to OSH standards. This includes the right of everyone on site to say stop in case they see the declaration not fulfilled or spot potentially dangerous behaviour. To overcome cultural and language differences, images and cartoons work very well and create a common understanding on construction sites. In conclusion, while investments into better social relationships do not have a high cost, they could potentially benefit companies greatly. A problem is that company declarations are not enforceable, although these rules are in any case related to obligatory legal requirements. Therefore, a declaration should serve more to reach a better common understanding on construction sites.

In the framework of the **discussion**, attendants remarked the following:

- Participants noted that other sectors, such as airlines, have a **culture of reporting** every incident. However industries such as construction are lacking this culture and these issues are rarely discussed among workers.

- In contrast to airlines, **accident investigation** is less reliable and it is difficult to gather data due to the fact that more parties are involved and nothing comparable to an airplane's black box exists.

- Philippe Emsalem (Avyso/OPPBTP) remarked that this culture of reporting of accidents and near-misses exists also in industry (e.g. gas industry, nearer to construction sector), which experience and methodology could be of some interest.

- A **lack of learning** was also discussed, since construction workers often are fired following accidents and, in addition, the latter are not properly communicated and thereby the opportunity to learn from them is lost.

- Mr Martin Sonnberger (Porr AG, FIEC) noted that a problem consists also in deciding who should get which information and in which form. Currently, site managers are **overloaded with information** (on OSH, environmental rules, etc.) while having to prepare the site. This makes it difficult to prioritise.

- Mr Karlheinz Bauer (Labour Inspectorate Steiermark) added that it is particularly difficult to **address SMEs** and get the right information to them. His Inspectorate developed one pagers to convey the most important information to companies and facilitate learning.

Fourth Presentation: Preliminary taxonomy of costs and benefits of OSH standards
Mr Andrew Howard (Oxford Research) gave the last presentation of the day. He started by presenting the approach to developing a taxonomy of costs and benefits of OSH. The first step was

a literature review[91] on these costs and benefits, followed by a review of the mapping on OSH initiatives from Task 1. Together, these will be used to establish a taxonomy and to conduct a causal chain analysis on how OSH initiatives may lead to positive outcomes. After listing some of the heightened OSH risks in construction (ongoing transformation of the work site, macho culture, many SMEs and micro firms, migrant workers, etc.), he presented the preliminary costs and benefits:

- *Direct benefits* come from the reduction in workplace accidents, and thereby the reduction in insured and non-insured costs.[92]

- *Indirect benefits* are derived from enhanced productivity, enhanced company reputation and stronger performance and quality of services (as perceived by clients in reduction of defects).

- *Direct costs* stem from participation costs in OSH initiatives (staff time, training costs, new equipment, etc.) and the ongoing costs from accidents that are not avoided.

- *Indirect costs* are opportunity costs from missing investments used for the OSH programme for other commercial activities.

Finishing his presentation, Mr Howard showcased the identified costs and benefits via the example of the Holistic Inspection Method of the Danish Working Environment Authority.

The following main points came up during the **discussion**:

- After a question from Mr Sonnberger (Porr AG, FIEC), it was clarified by Mr Kastberg (Arbejdstilsynet) that **construction site coordinators** play an important role in the Danish inspection method and that the Danish approach actually propped up the power of coordinators to affect their construction site.

- The importance of the **coordinator** getting everyone around one table, so that it becomes more difficult for individuals to avoid responsibility was discussed as well as the duty of coordinators to identify risks early on in the pre-construction coordination plan.

- **Problems** with this approach to coordinators' role are that the coordinator might change throughout a project's lifecycle and that, while these standard rules apply for every site with multiple contractors, no one wants to takes responsibility for safety overview, especially on smaller sites (e.g. house construction).

- Initiatives such as the Danish example could also be promoted as **good practices** in the consultant's handbook. However, the handbook should focus more on company specific initiatives that individual companies could implement.

- Mr Elsler (EU-OSHA) noted that the **taxonomy** would be difficult to implement if only costs that arrive at company level are taken account, since many benefits of OSH measures can be very long-term. For example, work related cancer is currently a major issue. Avoiding long-term sick leaves is something companies could benefit greatly from (especially in countries where companies pay for long-term sick leave), however these costs are often not considered.

- Mr Merz (BG BAU) warned that there are huge **differences across Member States** and OSH initiatives might not be easily comparable. Mr Howard (Oxford Research) assured that the aim is not a comparison of different systems, but instead to highlight interesting approaches found in the research, as Danish companies were very positive about the Danish example.

[91] The literature review was shared with attendants prior to the meeting.

[92] The distribution of these costs depends on the specific national situation in a Member States, the development of its insurance market and national regulations.

- On the **categorisation** of costs and benefits, Mr Jorge Pereira (Authority for Working Conditions, Portugal) remarked that these need to be clearly specified and described with the right wording (e.g. instead of mental risks it should sate psychological risks).

Concluding remarks & Next steps

Ms Saraï Sapulete (Ecorys) concluded the meeting by announcing that the next meeting on the pilot case study and the financial framework is planned for **21st of May in Brussels** and reiterated the **main conclusions**:

- The **mapping** should reflect a broad overview across Member States, sub-sectors and of initiatives at different levels to facilitate the creation of a useful tool that relates to various situations that companies might find themselves in.

- It is also important to consider differentiating between initiatives aiming at regulatory compliance and those that go beyond.

- For the **taxonomy**, costs to companies may differ on how much they get from states/associations/etc. (Different per Member State and per initiative).

- It is often difficult to isolate costs and benefits, and it is therefore important to consider limitations of the study and be open about it.

- It is difficult to take into account long-term and less visible cost and benefits.

- It is important to ensure that the final output in form of the **Handbook** is useful, practical and accessible to enterprises. If the handbook does not reach SMEs, then the study is interesting but in the end not very useful. It will be a huge **challenge** to bring this added value across to companies.

In light of the last comment, Mr Roman Horvath (DG GROW C.1) reminded everyone that one study does not have the potential to change everything, but that for this particular challenge the consultants will also depend on stakeholders for active feedback and to act as multipliers and share the handbook with their members. Thereafter, he closed the meeting and thanked everyone for their contributions.

List of participating organisations

Organisation
Arbeitsinspektorat Steiermark
European Commission - EASME
EU-OSHA
AVYSO
Ecorys
European Commission - DG EMPL B3
EFBWW
ISHCCO - International Safety and Health Construction Coordinator's Organisation
European Commission - DG GROW C1
Oxford Research
COBATY International
Arbejdstilsynet
ZDH (German Confederation of Skilled Crafts and Small Businesses)
Health and Safety Authority, United Kingdom
Ministry for the Ecological and Inclusive Transition, France
BG BAU Berufsgenossenschaft der Bauwirtschaft
AEIP
ACT - Authority for Working Conditions
Federal Ministry of Labour and Social Affairs, Germany
FIEC - Porr AG
ELINYAE
Ministry Of Labour, Family, Social Affairs And Equal Opportunities, Slovenia
Constructiv
European Confederation of Woodworking Industries ** CEI-Bois
European Builders Confederation
Institute for Employment Studies

EUROPEAN COMMISSION

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

Industrial Transformation and Advanced Value Chains

Clean Technologies and Products

Development of an EU framework to assess the overall impacts of occupational health and safety (OSH) prevention on the performance of construction enterprises

2nd Stakeholder Meeting – Financial Framework and Case Studies 21st May 2019

Av. D'Auderghem 45 – 1040 Brussels, meeting room F. Braun/BREY, 5th floor

Minutes of the meeting

Introduction: Occupational Health and Safety (OSH) in the construction sector

Mr Roman Horvath (DG GROW C.1) opened the meeting by welcoming all participants and explaining the purpose of the study. He stressed that the motivation for the study was that health and safety are often seen only as obligations for companies, which neglects the business case behind many OSH prevention measures. Therefore, this study focuses on the financial viability of OSH measures and on preparing guidelines for companies to invest in OSH in a profitable manner. The idea is neither to question legal obligations nor to neglect other positive outcomes of OSH in regard to environmental and social aspects. These are valid reasons for companies to implement OSH measures. However, this study aims at adding an economic reason to investing into OSH.

After the short introduction by the European Commission, Ms Saraï Sapulete (Deputy Project Manager Ecorys) provided a short background on the study and reiterated some conclusions from the last stakeholder meeting. In terms of **planning**, a mapping of OSH initiatives across Europe as well as a taxonomy of costs and benefits of OSH have been completed and presented during the last stakeholder meeting. The contractor is now finalising the framework for the financial analysis and preparing to conduct case studies. The outcomes and the practical handbook promoting the framework and case studies will be presented at the last stakeholder meeting in October. **Conclusions** from the last meeting include, but are not limited to the following insights[93]:

- It is important to consider differentiating between initiatives aiming at regulatory compliance and those that go beyond.
- It is often difficult to isolate costs and benefits, and it is therefore important to consider limitations of the study and be open about it.
- It is difficult to take into account long-term and less visible cost and benefits.
- It is important to ensure that the final output in form of the Handbook is useful, practical and accessible to enterprises. If the handbook does not reach SMEs, then the study is interesting but in the end not very useful. It will be a huge challenge to bring this added value across to companies.

After this introduction, the first speaker was invited to present.

First presentation: Return on Investment in Prevention - From Theory to Practice

Mr Philippe Emsalem (AVYSO and OPPBTP) presented a study that AVYSO conducted in France and Luxembourg. The main goal of this study was to make companies invest into prevention measures. A problem when speaking of return of investment (RoI) in prevention is that costs are clear and visible but benefits are uncertain. Therefore, the study proposed a more positive spin

93 The full list can be found in the minutes of that meeting.

showing effective gains and benefits, which put direct links between measures and positive outcomes. The study needed to make use of some assumptions and could not be based on randomised and controlled trials, since mostly cases are put forward that have positive outcomes. The study differentiated between prevention per object and per effect. The latter is based on actions that did not aim to improve prevention, but had positive side-effects for OSH. The former regards initiatives with a specific OSH objective in mind. The study used observations of before and after OSH measures were implemented and evaluated the economic impact over the whole period from the decision and conception over the implementation and purchase to exploitation, quality and sales. Costs were mostly visible in the first phases, while benefits took over later on. For OPPBTP, AVYSO analysed over 250 cases in France and for IFSB 10 in Luxembourg. In the former research, these were shown in a detailed and complex report with many indicators[94], while in the latter the results were provided in a practical handbook and used only three indicators[95]. Overall, the average payback period was found to be 18 months with a return of over EUR 3 per spent euro. Of course, these outcomes are based on best cases, but show a positive RoI of prevention and moreover that the smaller a company is, the higher the returns are.

The main points raised in the discussion were the following:

- Upon question from FIEC, Mr Emsalem clarified that possible **incentive schemes** were not taken into account, since the aim was to show the case for OSH in general and not Member State dependent.
- For Rolf Gehring (EFBWW), he also clarified that the prevention of **chronic diseases and psychological risks** were not included, since these are very long-term and borne by society and the healthcare system.
- Mr Antonis Targoutzidis (ELINYAE) asked if the study considered **accident probabilities** before and after OSH measures, since these are miniscule for smaller companies and therefore problematic to calculate. However, Mr Emsalem cleared up that the study looked only into **productivity** and **quality** changes and did not look into accident probabilities. At OPPBTP prevention is seen as part of operational excellence: better prevention goes hand in hand with better organisation which also leads to better productivity.
- The effects were easy to measure for cases regarding the purchase of new equipment. Here productivity gains were easy to observe, however for materials or training these effects are more complicated to measure.
- The selection of companies was balanced across small, medium and large enterprises. Some companies had multiple case studies.
- The effects of reduced sick leave and employee turnover were not taken into account, since they are often not measurable.

Second presentation: Presentation of the framework for the financial analysis and assessment
Mr Martin van der Ende (Ecorys) demonstrated in his presentation the financial framework. The framework takes a company perspective and therefore does not include societal and worker costs or benefits. However, it considers many different factors and users can select various inputs (e.g. number of employees, three different construction sub-sectors, combinations of different OSH measures, Member State the company is active in). The key outputs of the framework are the accident rate before and after a measure as well as the net present values of costs and of benefits. The framework compares net benefits from prevented accidents and other benefits such as productivity gains to OSH investment costs. In this way, the framework differs from the study presented in the previous presentation, since outcomes do depend on accident reductions. It currently remains a somewhat theoretical framework with much input coming from desk research and Eurostat, but additional inputs will be fed into it from the case studies and from stakeholder feedback. A few first insights were also presented. For example, not all risks are equally relevant for all sub-sectors, preventing multiple risks is more effective than one due to shared costs, costs per worker (for procedures, management, certification or fines) depend on firm size and finally accident reduction is more beneficial in Western Europe due to the higher labour costs. Finishing his

94 OPPBTB (2017) Une approche économique de la prevention. Available at: https://www.preventionbtp.fr/content/download/152599/1372437/file/Approche-economique-WebSecu.pdf

95 IFSB (2014) la prévention, un facteur de performance économique. Available at: https://www.ifsb.lu/IMG/pdf/brochure_prevention_fr_print.pdf

presentation, Mr van der Ende displayed the current framework to participants and explained how it could be used and how one can change different variables.

In the **discussion**, stakeholder raised many points, among them were the following:

- A concern raised by Mr Campogrande (FIEC) and supported by many stakeholders was that the current **complexity** of the financial framework makes it difficult for companies to use it. The contractor and the European Commission clarified that this complex framework is only the first step. A second step, will be adapting and simplifying it based on stakeholder feedback and feedback from case studies.
- In regard to this, Ms Nielsen (Danish Trade Union Confederation) added that it will also be important to keep it **updated**, since risks and fines change over time. They have tried something similar in Denmark, however it was too **complicated** to implement and she worried that this is even a bigger challenge on EU level. Mr van der Ende replied that indeed costs and technologies change, updating the framework will be unavoidable and the complexity depends on the way it is used. For example, companies fall into different categories and not every input is important for each company.
- Another point of concern voiced, was the possibility of having **negative outputs** in terms of the probability of OSH measures, especially in countries with low labour costs. It was worried that this might be counterproductive in promoting OSH measures that go beyond minimum legal compliance. Here Mr van der Ende responded that indeed the framework is a two-edged sword and that negative outputs are possible in its current state. Future versions potentially could only show positive investments or one could also draw policy conclusions from negative ones, designing policy around it (e.g. by increasing fines for OSH obligations were investments do not pay-off).
- Mr Emsalem (AVYSO) remarked that in their study they also had a few **negative cases**. It is impossible to make a tool that shows only good aspects, but it is important to show positive aspects. In their case, the study showed that prevention costs less than many people think, which has already a positive impact and negative cases can provide important information.
- Mr Eugenio Quintieri (EBC) requested to have a longer discussion with the European Commission on what to do with the financial framework and be attentive to its **potential uses** before disseminating it to a wider audience. Additionally, he added that it would be good if stakeholders can review the methodology behind the framework. He also advocated that the **end-product** should be a simpler version with less grand assumptions, maybe a combination of the current approach and the approach taken by AVYSO.
- Mr van der Ende (Ecorys) clarified that the framework makes use of lots of data and includes EU average accident rates. The idea is to complement this with company data. Of course it needs to be discussed how best to make use of this econometric exercise and turn it into something beneficial for the sector. Ms Sapulete (Ecorys) added that the main output should be user friendly and the framework is only the theoretical part of it. It has not yet been discussed if certain measures or variables should be selected but it will be thoroughly considered.
- Mr Antonis Targoutzidis (ELINYAE) remarked that there is a lot of **uncertainty** when estimating benefits of OSH measures, since it is based on reduction of accident probabilities. Even more so when several measures are combined. The estimates' quality will be something people might challenge. Mr van der Ende (Ecorys) in response clarified that his model is based on a study that compares the accident rates among companies with or without measures. When using multiple OSH measures then the outcome is based on an econometric formula. The assumptions and numbers behind it will have to be proofed in the case studies, but ultimately one could limit the selection to only one OSH measure.
- Mr Bernd Merz (BG BAU) warned that another complication is that on a **construction site** many issues are linked to other contractors and to the owner of the site. It is a complicated environment, where individual companies decision on OSH impact also all the other companies positively or negatively. The contractor responded that each company has still to make its own decisions and the framework can support these decisions on implementing OSH measures.
- Finally, the contractor clarified that the model uses a **modular approach** with many self-contained parts each with its own sources and assumption on which stakeholders are invited to provide feedback. Ultimately, it can be decided which parts of the model should be used for the end-product.
- It was agreed to prepare **guidelines on the financial framework** and distribute them together with the framework for further feedback.

Third presentation: Risk assessment on construction sites

After the lunch break, Mr Peter Kirkegaard (Bam-bus Initiative) presented a more practical view on how he and his consultants of the Preventive Service Bus[96] work with small companies. The presentation covered risk assessment in small companies (1-25 employees). The Preventive Service Bus is owned and financed by the social partners as part of a collective bargain in the construction sector and covers all of Denmark. Its objective is to advise owners, employees and organisations in the sector on health and safety issues. The Bam-bus initiative is not aligned with any stakeholder, but is placed in the middle as a neutral reviewer and adviser. However, in that role it does not possess any ability to sanction companies that do not comply with regulations. The Preventive Service Bus consultants either are contacted or seek themselves the construction sites and companies. At construction sites, they discuss with owners and employees OSH issues and make a general and processual risk assessment[97]. They also showcase technical aids that can reduce or prevent attrition or the risk of accidents. As an outcome of the discussions, the company should come up with an agreement that documents who is responsible for each issue and how and when these need to be taken care of. Mr Kirkegaard gave the example of three different companies, one to highlight the process of the initial discussions, one where a company was not aware of the risk legislation and an accident occurred and one where a company doing a similar job was properly prepared and secured its construction site. These examples highlighted the necessity of proper risk assessment for each construction site and for companies to discuss OSH issues in advance to plan and prepare their work. In his conclusions, he stressed the importance of separating the risk assessment into a general and processual risk assessment as well as that a viable and good method in small companies is the direct dialogue between employer and employees. Finally, next to OSH, this approach also benefits in form of better planning, having the right equipment, better quality of work and reducing the risks of fines.

In the **discussion**, participants added the following points:

- Ms Nielsen (Danish Trade Union Confederation) stressed the point that indeed SMEs need people to talk with. They do not need long leaflets or websites. Instead, the best way to **disseminate OSH knowledge** is by talking directly to companies. Similarly, the current project needs to consider how to disseminate properly its outputs.
- On the question of whether Bam-bus uses **financial arguments** when talking to companies, Mr Kirkegaard replied that they generally stress that OSH measures are an expense but also an investment. However, they cannot say much about financial returns and focus on other benefits such as better quality, loyal employees and less sick days.
- Mr Alfredo Soeiro (ISHCCO) brought up the topic of **occupational safety cards**, which are used for example in Finland[98]. He asked if these are also considered in Denmark. On this, Mr Kirkegaard replied that this is currently being discussed in Danish politics, but might be less about OSH and more about foreign workers. During the discussions, some other countries were mentioned where the use of safety cards was successfully implemented, such as Ireland and the UK. Overall, there was agreement on the usefulness of such cards, but concerns were voiced about its applicability under current legal frameworks.
- Since the Bam-bus initiative does in general not go beyond **legal requirements**, the question came up on how the contractor is addressing this in the current financial framework. On this, Mr van der Ende (Ecorys) clarified that what is legally required and what not is currently not differentiated in the framework, but it is possible to include further measures and risks (such as accidents during the commute). Ms Nielsen (Danish Trade Union Confederation) added that it is impossible to differentiate between what is legally required and what not, since these often overlap and depend on each Member State. More important is it to make people aware of the benefits of OSH measures in general.

96 www.bam-bus.dk

97 The general risk assessment is on awareness of general issues (e.g. common used chemical substances, rules like using technical equipment for transporting and lifting heavy loads, etc.). The processual risk assessment is in principle every different task done in the company (e.g. roofing, mounting of doors, windows, floors, etc.).

98 https://www.tyoturvallisuuskortti.fi/en

- Mr Kirkegaard also used the opportunity to point out that lack of OSH is not always about lack of knowledge but often about **behaviour**. Workers in Denmark generally know the rules, however often do not follow them. Here it is important to change the attitude among companies on this issue.
- Mr Campogrande (FIEC) inquired the inclusion of qualifications in the framework, which was confirmed by the contractor, however only in regard to safety qualifications (three types of trainings).
- Finally, Mr Kirkegaard informed participants that Bam-bus has 14 employees, while there are 60 000 construction sites in Denmark. They can contribute only a little, but are well-known in the sector and are already happy that they could to lift the bar for OSH standards. Mr Merz (BG BAU) added that they have a similar programme in Germany but only 2 employees more for 400 000 construction sites.

Fourth presentation: Presentation on the case studies

The final presentation was given by Ms Saraï Sapulete (Ecorys). She presented the approach, selection criteria and status of the case studies. As part of the study, 20 case studies will be conducted on-site with companies that have recently or are currently implementing an OSH initiative. These initiatives should go beyond pure compliance with legislation. Input from the case studies will also be used to update and adapt the financial framework where necessary. A questionnaire has been developed for the interviews and first potential case studies have been contacted. Contact has been arranged with the Dutch initiatives 'Red safety sign' and the 'Tower cranes directive' and 'Scaffolding guideline'. Moreover, the 'Bam-bus' initiative in Denmark and the 'Partnership with Mind' initiative by the UK company Laing O'Rourke are considered. One of these will be chosen as a pilot case study, to first test the interview guide and how best to receive valuable input on the financial framework. Based on this, other case studies will then be planned and conducted between May to August. A challenge has been to motivate companies to participate and explain the purpose of the framework. In order to alleviate this, the contractors will make use of the contacts made during the mapping and ask country experts to identify fitting companies. Participants of the meeting were also invited to put forward potential contacts.

During the **discussion,** the following points were raised:

- The contractor clarified that the **interviews** will be guided but will also allow for open answers. Companies will be informed on the type of questions in advance, so that they can prepare the information and the contractor receives information that can be used to verify the assumptions made in the framework.
- Ms Nielsen (Danish Trade Union Confederation) suggested that it is also important to not only **interview** the employers but also safety representatives and persons responsible for OSH to get a more complete picture.
- Mr Eugenio Quintieri (EBC) remarked that it would be very beneficial if stakeholders can have a closer look at the framework and the methodology behind it. This would allow them to give **feedback** and avoid the contractor going into interviews with questions based on wrong assumptions and potentially a wrong model. Ms Sapulete (Ecorys) as well as Mr Horvath (DG GROW) agreed with the notion and confirmed that the **framework** would be shared together with a **guideline document** among stakeholders for their input. However, in parallel case studies should be organised to test the assumptions and in order not to run into too many delays while waiting on feedback.
- Mr Emsalem (AVYSO) added that it is important to include in the **guidelines** detailed information on what is behind variables, how to make changes and on what options were made to arrive at certain assumptions.
- On a question by Mr Pereira (Portuguese Authority for Working Conditions), the contractor clarified that the **selection criteria** for **case studies** are the following: EU geographical coverage, type of OSH risks, balance of company sizes and balance of sub-sectors and professions. However, the goal is not representativeness, first case studies will be implemented based on availability and accessibility and then further will be selected to fill gaps.
- Finally, Mr Pereira (Portuguese Authority for Working Conditions) also added the importance of **targeting SMEs** as these would need to relate the most with the outcome of the study. The contractor agreed and noted that the target is to have most of the case studies with SMEs.

Concluding remarks & Next steps

Ms Saraï Sapulete (Ecorys) concluded the meeting by reiterating the next steps of the study with a final stakeholder meeting being planned for October. The final meeting will serve to present the outcomes of the study as well as the handbook and to validate findings. She then summarised some of the main conclusions of today's meeting:

- For the **financial framework** it is important to consider the question of user-friendliness and on how it could be simplified without losing its credibility and usefulness.
- In this regard, a two-step approach was chosen: 1st step, to develop a more comprehensive and complex framework, 2nd step, to simplify it and make it usable.
- For future usability, it will also be important to keep the framework updated, since factors such as risks change over time.
- It will also be important to be transparent about assumptions and to decide how to deal with negative outputs.
- In order to get proper feedback, a guide over the options chosen and assumptions made will be provided to stakeholders together with the framework.
- For **case studies** it will difficult to quantify results, therefore it is important to inform companies about question and allow them to prepare the correct information for the interviews.
- The summer break might make it difficult to reach some companies.
- There is a need for getting a balanced case study coverage from different sub-sectors, Member States and company sizes, while also remaining pragmatic.
- In addition, it will be important to target SMEs and get their feedback.
- The **handbook** will be the final output of the study, containing the framework, guidelines on how to use it and providing case studies as good examples on how to use it.
- Finally, while the study's scope is to look only into microeconomic benefits and show the business case for OSH, it will be important to be transparent and mention other benefits. Benefits such as macroeconomic and social ones are important reasons to implement OSH measures and the study should frame itself correctly showing that microeconomic benefits are only part of the wider picture.

Mr Roman Horvath (DG GROW C1) thanked attendants for their active participation and closed the meeting.

List of participating organisations

Organisation
DG EMPL
FIEC - European Construction Industry Federation
EASME - Executive Agency for SMEs of the European Commission
AVYSO and OPPBTP
Ecorys
EFBWW - European Federation of Building and Woodworkers
DG GROW
Oxford Research
COBATY International
Byggeriets Arbejdsmiljøbus
ZDH
Health and Safety Authority
Berufsgenossenschaft der Bauwirtschaft BG BAU
FH - Danish Trade Union Confederation
Authority for Working Conditions, Portugal
EBC
ISHCCO
ELINYAE
Ministry Of Labour, Family, Social Affairs And Equal Opportunities, Slovenia
Strukton Rail Nederland

EUROPEAN COMMISSION

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

Industrial Transformation and Advanced Value Chains

Clean Technologies and Products

Development of an EU framework to assess the overall impacts of occupational health and safety (OSH) prevention on the performance of construction enterprises

3rd Stakeholder Meeting – Dissemination
23rd October 2019

Av. D'Auderghem 45 – 1040 Brussels, meeting room F. Braun/BREY, 5th floor

Minutes of the meeting

Introduction: Occupational Health and Safety in the construction sector

Ms Fulvia Raffaelli (Head of Unit, DG GROW C.1) opened the meeting by welcoming all participants and stressing the importance of preparing the construction sector for the future. One particular challenge the sector faces is a skills shortage. This is partly due to public perception about poor working conditions and performance in occupational health and safety (OSH). Fewer young people will be interested to pursue a career in construction if the sector is perceived as unsafe, which adds to the many reasons to invest into OSH. For companies there are many motives to invest into OSH, however most companies see it as an obligation or as ticking boxes and not as an opportunity. The study discussed as part of this meeting takes an innovative perspective and looks into the financial motives and the business case behind OSH. The aim is to show companies the economic benefits of investing into OSH prevention measures. It should be noted that the study cannot cover all costs and benefits, for example, social and environmental costs are out of scope but also long-term diseases are not included due to limited data. Nevertheless, this study is only part of the bigger picture. There is other work that looks more into these aspects and companies should not be discouraged to also account for these aspects. Ms Raffaelli then concluded her introduction by highlighting the European Week for Safety and Health at Work[99] before giving the floor to Ms Saraï Sapulete (Project Manager, Ecorys).

After the introduction by the European Commission, Ms Saraï Sapulete provided a short background on the study and reiterated some conclusions from the last stakeholder meeting. She provided an overview over what has been done as part of this study and what the next steps are in finalising the project. Specifically, stakeholders will receive in the beginning of November an updated version of the financial framework for a last round of comments, before the study team finalises the framework as well as the handbook in November and December.

First presentation: Updates on the financial framework

Mr Martin van der Ende (Ecorys) presented on updating the financial framework. He reiterated that many studies exist on macroeconomic and societal benefits, but that the financial framework takes the company perspective. He then highlighted the changes that have been incorporated based on the case studies and the comments from stakeholders. An updated version for further comments will be shared with stakeholders early November. Some of the main comments already addressed, were the complexity of the framework and that there is too much of a focus on accidents over diseases. These have been addressed by simplifying the input and adding short-term diseases (not enough data is available on long-term diseases). Additional Member State data was also added to better reflect different situations across the EU. Moreover, negative results are not directly displayed anymore and the calculations on sick leave pay were adapted. Finally, the framework was enriched by adding OSH officers as an investment category and by using not only statistics from social insurance but also worker reports (which includes also accidents that caused less than three days of sick leave).

99 https://healthy-workplaces.eu/en/get-involved/european-week

After a short discussion on the decreasing marginal returns of bread, the main points raised in the **discussion** were the following:

- Mr Rolf Gehring (EFBH) noted that while short-term diseases are now included, the framework is still mainly on accident. It is therefore important to state this clearly in the framework in order not to mislead people as long-term diseases are a big risk and cost factor;
- Mr van der Ende indicated that the final framework will have an introductory sheet that highlights its limitations;
- Mr Roman Horvath (DG GROW) agreed that this should be included in the framework and its manual, clearly stating that due to lack of data the framework primarily focuses on accidents;
- Mr Matthias Fritz (DG EMPL) inquired about the possibility to take into account different situation in Member States as there are for example different state legislations on continued wage pay during sick leave;
- In response, Mr Martin van der Ende explained that this differs between topics. For some variables, country specific data was available (e.g. accident probabilities, sick pay), however for others such as collective agreements or fines it is difficult to find information. This limitation will also be mentioned in a disclaimer in the framework;
- Mr Horvath added that unfortunately it is very costly to cover all countries and that the lack of data in some countries makes it a very difficult exercise. Potentially, one could allow for user input to manipulate inputs to simulate situation in one's specific country. The study team should make suggestion on how to further improve the tool and address current limitations;
- He added that currently the aim is not to develop a mobile application, so the final product will be an Excel file, which will be published in two versions – a full model, and simplified model with just the input sheet;
- Mr van der Ende added to this that sources are clearly stated in the current framework, allowing people to update it with data once new data is available;
- Mr Philippe Emsalem (AVYSO and OPPBTP) proposed to highlight other benefits in the framework in cases where the investments are higher than the returns. In addition, even a negative balance can show that while there are no positive returns that costs are lower than expected;
- Mr Bernd Merz (BG Bau) voiced some concerns about the difficulty of measuring return from investments, especially if it also goes beyond safety and includes efficiency. He also mentioned that some of the accident numbers for Germany do not match with their numbers, however unfortunately the insurance cannot share them due to privacy issues. Moreover, it is important to consider the different insurance systems across Europe. For example, in Germany insurance premiums are generally stable, even after accidents, but in the UK they can quickly double. Finally, he mentioned that he is very happy to have this study, since it is one more that shows that investments are beneficial, but it is important to be aware of limitations;
- Mr Horvath agreed that it is complicated to cover all aspects especially across 28 countries. This study is a first step, which should be clear about its limitations. In future steps, these limitations can be tackled one by one starting from the most significant ones;
- Several stakeholders and the study team reiterated also the importance to look at safety culture, efficiency increases from new equipment and procedures and reputational effects;
- Closing the discussion, Mr Horvath expressed that they aim to diligently update the framework, but allow people to make their own changes and encourage curiosity. A master version will be kept on DG GROW's website with a disclaimer about the version of the framework.

Second presentation: Practical use of the financial framework

The second presentation by Mr Kees van der Blom (Strukton Rail Nederland) focused on the company perspective towards OSH and the financial framework as well as Strukton Rail's unique approach to OSH. He indicated that the research is very interesting and that the financial framework could be very useful for companies. However, he noted that it is important to take a holistic approach and not to look only at the aspect of OSH equipment. Much investment goes into equipment, but workplaces are also full of people and it becomes important to consider how one can invest into the people and their mind-sets. There needs to be a consideration of investing into software and not only hardware in order to change traditional mind-sets. In addition, Mr van der Blom advocated for a new

thinking in safety, from safety 1 to safety 2. Currently, we look at past accidents and try to put up many barriers to avoid future accidents. However, one does not know how the future situation might look like. It is difficult to assess benefits of investment. At Strukton Rail accident numbers are decreasing, but it is unclear how these relate to investments. Similar, the financial framework uses data from past accidents, which is the data we have. At Strukton Rail, the company is trying not only to invest into the past, but also into the future by investing into craftsmanship and resilience (safety 2). The company asks workers to look at their environments, creates scenarios and has them anticipate risks. Workers should reflect on how they would solve a situation and move from improvising to anticipating. Mr van der Blom concluded his presentation by reiterating that the aim is to keep workers in safe environments, but these can always change on construction sites. He also mentioned that Strukton Rail created a game together with the rail and oil industries and universities to practice these kind of behavioural changes.

In the **discussion**, stakeholder raised the following pints:

- Replying to a question by Mr Matthias Fritz, Mr van der Blom explained that they collect safety 2 information by talking to workers and asking them how they succeed in certain situations. If they think about it, they come up with good answers which can then be built into best practices. These can be turned into mind games or simulations. He recommended David Woods[100] and Erik Hollnagel[101] as two experts on resilience and safety 2 concepts;
- In addition, Mr. van der Blom explained that not everyone should be responsible for safety but it is important to talk with work leaders about team resilience;
- He also explained that Strukton Rail is helping scientist to translate their resilience theory into practice by developing useful models and games for workers and investing into their mind-sets.

Third presentation: Presentation on the study's outcomes

After the break, Mr Michael Flickenschild (Ecorys) gave a presentation that highlights the outcomes of this study: starting from the mapping of about 100 OSH initiatives across the EU, over the taxonomy of costs and benefits of OSH measures to the financial framework. He presented on the case studies and highlighted some aggregated results as well as examples from interviewed companies. The three main motives for investing into OSH among the interviewed companies are the safety of workers, legal compliance and company reputation. In contrast, the three main risks reported are falling from heights, accidents with heavy machinery and slipping and tripping on construction sites. Of course, the risk depend heavily on the type of company. One aspect mentioned by several companies was the need for more awareness and a safety culture in which workers report incidents actively and are more considerate of safety issues. All companies interviewed were also very positive about investing into OSH and most agreed that it decreases accidents and provides benefits from increased efficiency and reputation. Concluding the presentation, a concept of the handbook, its overall structure and draft contents were presented. The handbook will contain an introduction that outlines general benefits of OSH also beyond economic ones and an overview of some of the identified OSH initiatives. It will also contain an introduction to the financial framework with a short explanation and a link where to find it and a set of illustrative case studies showcasing company experiences and examples on how to calculate benefits with the framework. The overall idea is to highlight to companies the business case behind OSH while also flagging non-economic benefits such as societal ones.

Panel discussion on dissemination and use of the outcomes

The final part of the meeting was a panel discussion on the sustainability and effectiveness of the project results. Ms Saraï Sapulete (Ecorys) moderated the panel discussion and the discussants represented the construction industry (Mr Eugenio Quintieri, EBC), the accident insurance sector (Mr Bernd Merz, BG BAU), OSH coordinators (Mr Alfredo Soeiro, ISHCCO) and academia (Mr Antonis Targoutzidis, ELINYAE).

Opening the discussion, Mr Targoutzidis reflected on the overall study and the various opinions that were voiced. He sees the financial framework as a good first step with a lot of potential, but the next step will be to discuss how to make the best use of it and turn it into something beneficial for the

[100] https://complexity.osu.edu/people/woods.2
[101] http://erikhollnagel.com/ideas/resilience-engineering.html

sector. He stated that there are two types of construction companies, small ones and large ones. The goal should be to reach the small ones. However, making SMEs think about OSH is difficult unless it **becomes part of the bigger picture of doing business**. The tool can help by showing other motivations to invest into OSH. Another way to reach smaller contractors is via the larger ones. For example, in Greece many of the largest contractors have higher standards, which other companies have to fulfil to become eligible to work on a contract. **Making it a requirement to win work could be another channel of motivation**.

Mr Soeiro reflected that larger companies have already the advantage of having more funds and being better organised for investing into OSH. He added that the role of construction safety coordinators is important and should be strengthened. SMEs have to respect what the main contractor says in regard to OSH, but often larger contractors do not enforce these things convincingly. Safety coordinators can make the link between companies on construction sites and with the client. They deal with all sides and should be involved in preparing the construction site safety plan. Owners are obliged to have one, however often this is not followed up or dismissed. **Better recognition of the profession of safety coordinators and enforcement of current EU rules in Member States could serve to improve OSH on construction sites**. This could also be part of contractual obligations and regulated under EU legislations. **Making OSH part of construction contracts turns it into something clients pay for and will request to see in tenders**.

Mr Merz pointed out the changing landscape in construction. The development and deployment of BIM technology will change how construction sites look like. BIM technology will make the construction process more open and accessible to self-employed persons who can work jointly via a BIM platform. **Self-employed workers are not protected by any legislations only by their own safety considerations**. Moreover, the question of responsibility arises in a future with only self-employed people linked via a digital platform working on a site. **Who is responsible for OSH** – the platform owner, the self-employed workers or the client? The self-employed will face the costs in case of accidents but **the client or owner is the one with the money who could do more**. Finally, Mr Merz added that in order to raise the study's visibility, one should not simply upload it on a website. **Stakeholders need to share it with their clients, partners and their network**. For example, the related study from EU-OSHA[102] and the work done in France[103] is not well known in Germany. In order to reach people, stakeholder need to actively report about it. One study alone is not a powerful argument, but there are many showing the benefits of OSH. **If we want to convince smaller companies, we need to raise the awareness about these studies**.

Mr Quintieri reminded attendants that there is a similar discussion on BIM. Where the idea is to make its use an obligation to subcontractors and thereby speed up its uptake. However, it is important to ask, are clients willing to pay for OSH? In the end, someone has to make the investment and someone needs to be obliged. However, **putting OSH obligations solely on SMEs might endanger them**. In addition, health and safety conflicts with the goal of affordability. **If we want to improve OSH, we will increase costs and thereby decrease affordability**. Finally, he appreciated the good efforts on the handbook and financial framework, but added that there is the need to be pragmatic and a **big excel sheet is not the way to reach SMEs**.

In the subsequent open discussion, stakeholders agreed that the **framework** is a good first step to see if the approach is feasible and enough data is available, but that more funding is needed to turn it into something very useful. An example could be a web or phone application, which requires only basic inputs and provides simple outputs that focus on positive aspects and provide good ideas for investments. **Once the framework works, one can simplify it and moving to an app will become another step**. The **handbook** should be kept simple and avoid complex terminology (e.g. PV values). For the handbook it was also suggested by Mr Merz that it needs to i**nclude examples of typical companies** from typical branches (e.g. brick layers) in order to make it relatable for companies. Adding to this suggestion, Mr Soeiro suggested to add the client perspective. Ms Francesca Cattarin (AEIP) stressed the importance of language and suggested to avoid the word costs and instead use investments. In addition, one should make use of concrete examples. Mr

[102] EU-OSHA (2014) The business case for safety and health at work: Cost-benefit analyses of interventions in small and medium-sized enterprises.

[103] For example: OPPBTB (2017) Une approche économique de la prevention.

Emsalem advised also to have a one-page or two-page summary with the main points at the beginning of the handbook. Another option to reach companies and improve OSH levels that was proposed is to **make use of public procurement rules** as is done for example in Finland. However, while the idea seems good, some stakeholders are sceptical as OSH depends much on culture. Procurement rules alone will not induce change. Mr Merz offered to share the tariff structure of BG BAU with the study team which provides numbers on the risk factors which vary between construction professions. Finally, Mr Horvath suggested organising **a meeting or exchange with Member States** to get their reactions and ideas on the issues discussed in this meeting.

Concluding remarks & Next steps

Ms Saraï Sapulete closed the discussions and concluded the meeting. She reiterated some of the main conclusions of the day, which included:

- For the financial framework it is important to be open about its limitations;
- Important to follow-up after the conclusion of this study, the financial framework as an excel tool is only the first step;
- It is essential to work on its limitations and consider how it can be developed into a more practicable tool;
- The handbook should highlight case studies and the benefits mentioned by companies, especially also those going beyond accident reduction;
- OSH needs to become part of the bigger picture of doing business;
- It is important to not only invest into equipment but also people;
- Other motivations to improve OSH could be requirements from larger contractors, clients or public procurement;
- However, it is important to put not too much pressure on SMEs, who might have difficulties to keep up with too many requirements.

The study team will use the valuable input to update the financial framework, the handbook and to prepare the final report for the European Commission. In addition, Mr Horvath added that when launching the project the European Commission had only a limited view on all the aspects discussed throughout the study. Having now a more complete view, they are also considering other aspects such as communication and the translation of the handbook.

List of participating organisations

Organisation
EU-OSHA
EASME
AEIP
CEMBUREAU
AVYSO and OPPBTP
Ecorys
European Commission, DG EMPL
EFBH
European Commission, DG GROW
COBATY International
BG BAU
EBC
ISHCCO
ELINYAE
Strukton

Annex 6: List of identified OSH initiatives

Included as a separate Excel-Annex.