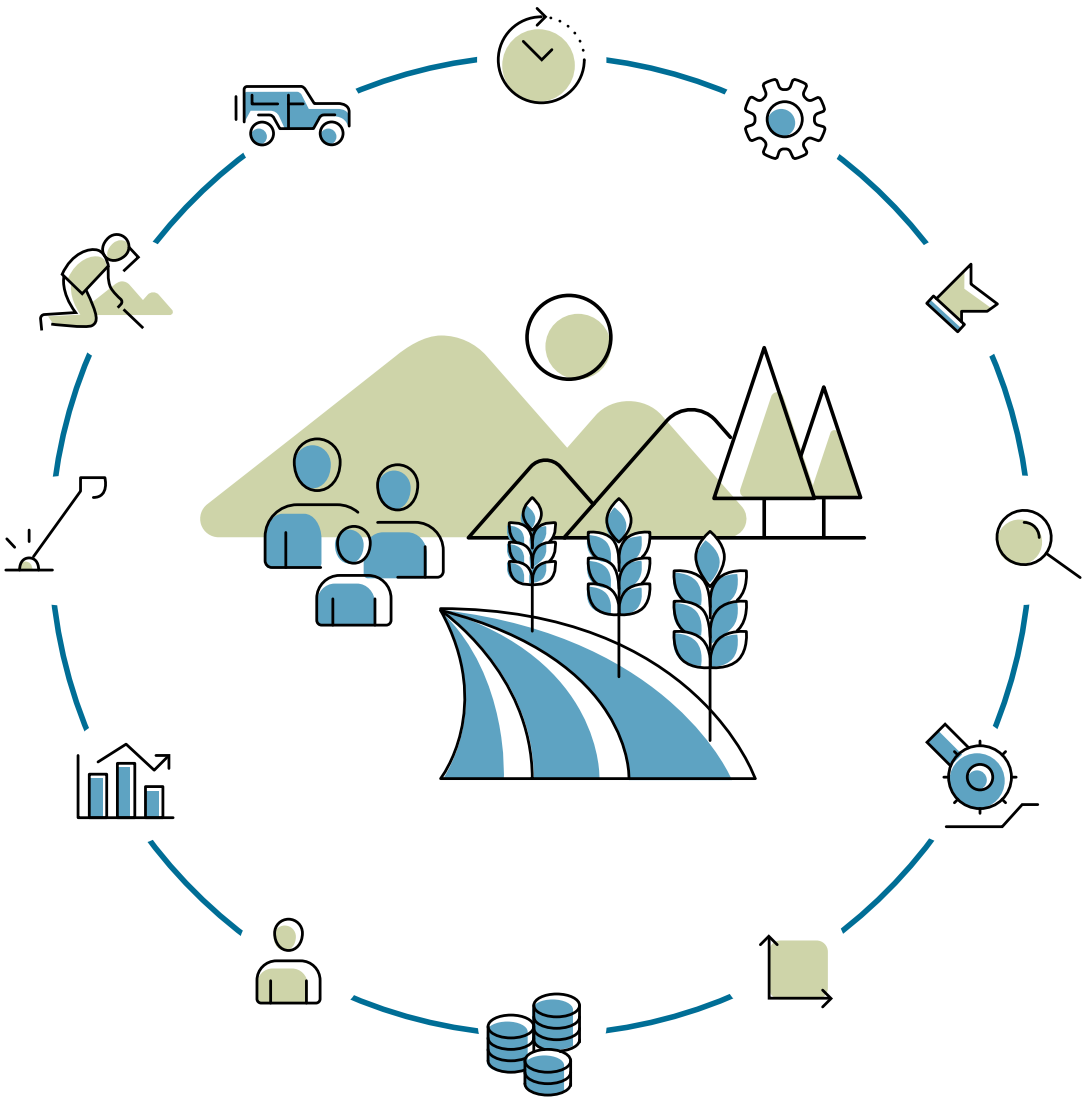

GICHD

OPERATIONAL EFFICIENCY IN MINE ACTION

MARCH 2023

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ACKNOWLEDGEMENTS

The Geneva International Centre for Humanitarian Demining (GICHD) expresses its utmost gratitude to the people and institutions that so generously collaborated to produce this study by sharing data, experiences, resources and expert feedback.

The present publication was developed by Armen Harutyunyan and Danielle Payne (GICHD) as well as David Hewitson and Raphaela Lark (Fenix Insight Ltd.).

This study was requested and funded by France, with additional funding support from Germany and Switzerland. The ideas, opinions, and comments herein are entirely those of the authors and do not necessarily represent French, Swiss or German government policy.

DISCLAIMER

The key performance indicators (KPIs) outlined in this study are accompanied by contextual information on known factors that might have affected the results. It is important to note, however, that the study does not intend to provide in-depth analysis of every country measured for each KPI. Mine action stakeholders should therefore exercise caution when using any of the data or key performance indicator values presented in this study as a basis for setting contractual terms or other fixed parameters in standards, agreements, task orders or other binding documentation. **It is essential that the data be interpreted in context, otherwise it may generate misleading or inaccurate conclusions.**[1]

No country should be considered as having a 'good' or 'bad' performance in terms of operational efficiency on the basis of the KPI values in this study. Furthermore, it is imperative to remember that, when working to enhance operational efficiency and productivity in mine action, **safety must always be the primary consideration.**

The use of KPIs to evaluate the performance of mine action operations can provide a narrow and incomplete picture, as efficiency metrics **do not take into account the effectiveness of the operations in achieving their intended objectives.**

A study undertaken on this scale cannot ensure that every data point has been counted, collected and reported in exactly the same way by every respondent. Indeed, although the study is based on a substantial sample of operational activity, its authors did not have access to every possible data point. The aggregation and averaging of results have provided generalised findings. As such, this study and its findings are to be used only to encourage greater awareness of the importance of relevant operational performance data and of improved consistency in their collection, analysis and dissemination.

This study is based on information, provided by multiple organisations, that was available at the time of its preparation. There is no guarantee of the accuracy or completeness of the information and thus any decisions made on the basis of this study are strictly the responsibility of the decision maker.

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the GICHD concerning the legal status of any country, territory or armed group, nor concerning the delimitation of related frontiers or boundaries.

[1] Technical Note 07.11/02: Key Performance Indicators (KPIs) for Land Release and Stockpile Destruction Operations (version 1, March 2021).

EXECUTIVE SUMMARY

In the mine action sector, as in so many others, efficiency is a central concern in operations. The aim is to deploy survey and clearance resources and use financial resources in such a way that they produce the greatest output.

Efficiency in mine action is defined as a measure of how economically resources/inputs (funds, expertise, time, etc.) are converted to results (outputs and outcomes). This study aims to provide a framework for mine action stakeholders to review the efficiency of their own land release operations, identify potential improvements, make evidence-based decisions and identify areas for improvement in a complex and dynamic context.

Land release operators, mine action authorities and other entities running a variety of programmes in 17 countries were approached with requests for information. Data from 2015 to 2019 was collected to allow for a timespan while avoiding the consequences of the coronavirus disease pandemic on land release operations. Two countries (Cambodia and Lebanon) were studied in greater detail to obtain additional contextual and performance data. The KPIs used in the study are:

1. ratio of land cleared to land released;
2. number of square metres of land released per item of explosive ordnance found;
3. number of square metres of land cleared per item of explosive ordnance found;
4. cost per square metre of land released;
5. cost per square metre of land cleared;
6. cost per item of explosive ordnance found;
7. number of 'deminer days' spent per item of explosive ordnance found;
8. number of square metres cleared per asset (deminer) per day;
9. productive resource ratio;
10. productive time ratio; and
11. productive cost ratio.[2]

In addition to using these quantitative KPIs, the study analysed qualitative information, relating for example to the type of terrain or the composition of the demining team, with a view to ascertaining why a KPI might lead to a certain result and being able to address the root causes, where possible.

The study confirmed that some KPIs are better suited than others for use at certain levels and in certain contexts. The KPIs related to released land, for example, have more value at a higher-level strategic or programmatic level, as they provide an overview of the relationship between total inputs (programme funding for instance) and total outputs (land released by all methods). These KPIs are of less use when analysing the more technical dynamics of daily operations when the very different products of land release activities (land cancelled, reduced, cleared) all come into play. It is vital to consider multiple KPIs when evaluating the efficiency of land release and clearance operations as each KPI will measure a different aspect of the process.

The study has resulted in a set of recommendations that are intended to provide guidance for both mine action organisations and governments. Each recommendation is accompanied by a brief explanation of its rationale and potential impact on the overall efficiency of the operation. The recommendations are intended to be flexible so that they can be adapted to different contexts, and they should be considered in conjunction with the specific circumstances and priorities of each individual operation.

[2] The final three ratios relate to the relative proportions of productive resources (those that are directly engaged in the physical processing of land for release), their work time and cost versus enabling resources (those that carry out an activity needed to enable safe and effective action by the productive resources, but which do not process land for release directly themselves).

Quality management processes as applied to land release operations at work in Colombia. *Photo credit © GICHD*

The study's recommendations are as follows:

Data collection

1. Mine action stakeholders should enhance data collection efforts. A review of Technical Note 07.11/02: Key Performance Indicators (KPIs) for Land Release and Stockpile Destruction Operations and of IMAS 05.10: Information management for mine action should be undertaken with a view to including details on the collection and analysis of data relevant for the measurement of key performance indicators related to cost. The minimum data requirements in annex B to IMAS 05.10 should be expanded.

Use of key performance indicators

2. Mine action stakeholders should encourage greater use of the KPIs in Technical Note 07.11/02: Key Performance Indicators (KPIs) and the development of additional ones that can help improve understanding of operational efficiency and support the communication of the value for money offered by a mine action operation. NMAAs and mine action organisations can use the conceptual framework set out in the present study, including the key performance indicators, as a basis for demonstrating the results of their efforts to improve the value for money that they offer.

3. Managers should use KPIs to better inform their decision-making processes in order to ensure that the principle of 'all reasonable effort' has been applied in situations where the commitment of additional resources might be considered unreasonable in relation to the results expected.

Performance management and capacity-building

4. Mine action stakeholders should invest in the further development of their capacities in terms of operational efficiency management as part of broader management training and professional development programmes.

5. The use of KPIs should be promoted in training courses on non-technical survey, including in relation to the implications of the definition of suspected hazardous areas and confirmed hazardous areas for the efficiency of land release, and on quality management.

Research

6. Research on the effectiveness of land release operations should be undertaken.

Policymaking

7. Donors should consider adapting their policies or reviewing the contractual modalities governing the allocation of funded resources between tasks and teams in order to facilitate operational management and improve operational efficiency.

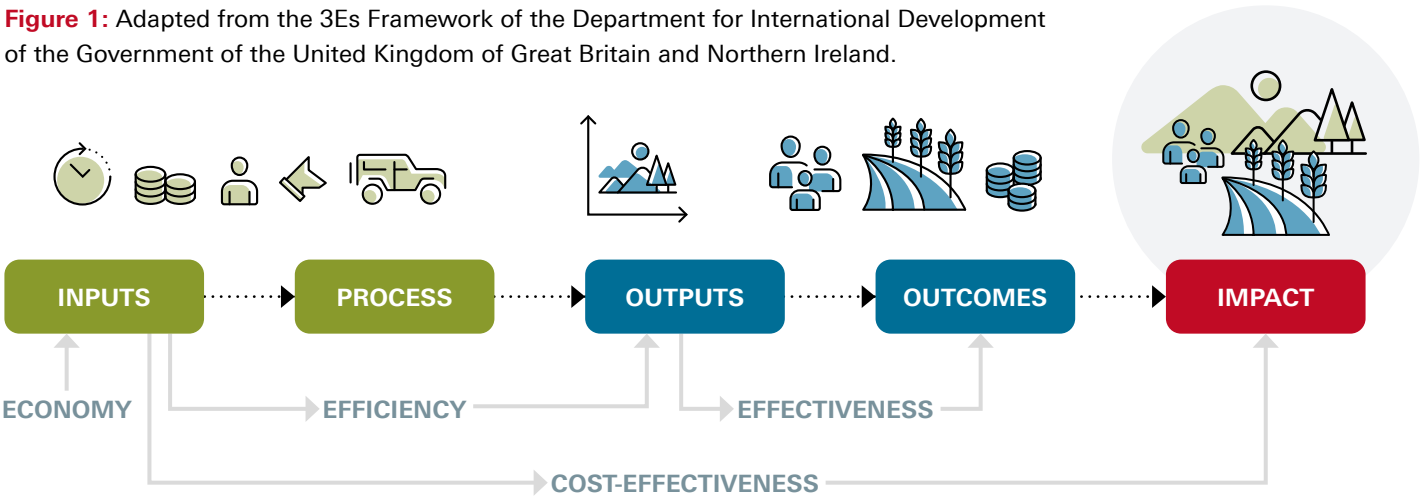
INTRODUCTION

In the mine action sector, the questions of how to deploy survey and clearance resources efficiently and how to optimise the use of financial resources to achieve the greatest output have both immediate operational implications and wider political ones. This study was requested and funded by France during its presidency of the Mine Action Support Group in 2022. Its aim was to provide states and other stakeholders with information on the efficiency of land release operations. The GICHD has used additional funding support from Germany and Switzerland to complete the study. The request was driven by a desire to better understand how organisations can measure their efficiency in order to improve their overall performance and the value for money that they represent.

What is operational efficiency and why is it important?

Measures of efficiency are typically ratios expressing the relationship between what is put into a process (people, time, money, other resources, etc.) and what comes out of that process (in the case of mine action, land, information, etc.). Efficiency in mine action is defined as 'a measure of how economically resources/inputs are converted to results'.[3] It is distinct from effectiveness, which is defined as 'the extent to which the intervention's objectives were achieved, or are expected to be achieved, taking into account their relative importance'.[4]

Figure 1: Adapted from the 3Es Framework of the Department for International Development of the Government of the United Kingdom of Great Britain and Northern Ireland.



Value for money in mine action is also associated with the concept of result-based management, whereby all actors involved in efforts to achieve a desired set of results ensure that their processes, products and services are focused on the achievement of those results (outputs, outcomes and higher-level goals or impact). Information gathered in relation to these results is then used by stakeholders to support evidence-based decision-making for the development and implementation of programmes and to support activities focused on ensuring accountability and reporting.[5] Figure 2 gives an overview of a mine action results chain, with some concrete examples of the inputs, activities, outputs, outcomes and impacts of mine action interventions.

[3] IMAS 04.10: Glossary of mine action terms, definitions and abbreviations (second edition, January 2003; amendment 10, February 2019), definition 3.84.

[4] IMAS 04.10: Glossary of mine action terms, definitions and abbreviations (second edition, January 2003; amendment 10, February 2019), definition 3.85.

[5] United Nations Development Group, Results-based Management Handbook: Harmonizing RBM concepts and approaches for improved development results at country level (2011), accessed February 24, 2023, https://unsdg.un.org/sites/default/files/UNDG-RBM-Handbook-2012.pdf.

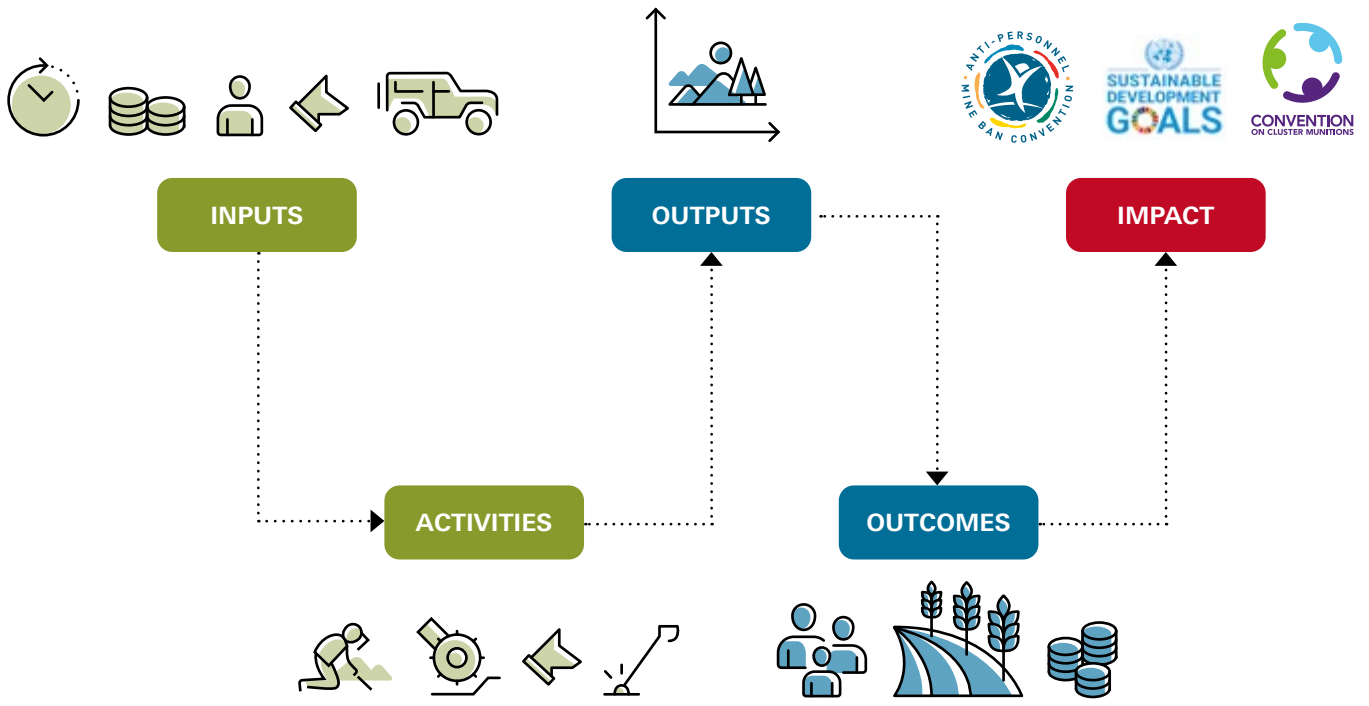


Figure 2: An illustration of the results chain in mine action, focusing on efficiency (GICHD).

The topic of operational efficiency in mine action remains a crucial area of focus for stakeholders within the sector. For example, in 2011 the Department for International Development of the Government of the United Kingdom of Great Britain and Northern Ireland produced a paper on the importance of achieving value for money in its aid programme, as per its 3Es Framework (economy, efficiency, effectiveness).[6] The German Federal Foreign Office too, in its Humanitarian Mine Action Strategy 2022–2023, which guides the selection process for priority countries in need of assistance, places strong emphasis on both effectiveness and efficiency. One of the criteria used to determine the selection of a priority country is how likely that country is to achieve results with less effort, cost and time spent than other similarly affected countries.[7] The Organisation for Economic Co-operation and Development uses six criteria in its evaluation framework to determine the merit or worth of an intervention: relevance, coherence, effectiveness, efficiency, impact and sustainability. In this model, efficiency is an important aspect as it helps evaluators determine whether an intervention is delivering results in a cost-effective and timely manner and whether the resources used can be justified by their results.

Efficiency and effectiveness are also key components of the Oslo Action Plan, which details the actions that States Parties will take during the period 2020–2024 to support implementation of the Convention on the Prohibition of the Use, Stockpiling, Production and Transfer of Anti-Personnel Mines and on their Destruction, known as the Anti-Personnel Mine Ban Convention. The Plan emphasises the importance of keeping national mine action standards up to date in line with the latest International Mine Action Standards (IMAS) in order to ensure efficient and effective implementation. The plan also calls for taking appropriate steps to improve the effectiveness and efficiency of survey and clearance operations, such as through the promotion of research into and the application and sharing of innovative technological means.[8]

[6] Department for International Development, "DFID's Approach to Value for Money (VfM)," July 2011, accessed February 24, 2023, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/49551/DFID-approach-value-money.pdf.

[7] Federal Foreign Office, Federal Foreign Office Humanitarian Mine Action Strategy within the framework of Federal Government humanitarian assistance 2022–2023 (n.d.), accessed February 24, 2023, https://www.auswaertiges-amt.de/blob/2378724/a5b2a266e65ef4941cd988fb929a9f16/200828-strategy-of-the-federal-foreign-office-on-humanitarian-mine-action-within-the-framework-of-humanitarian-assistance-of-the-federal-government-data.pdf.

[8] Oslo Action Plan, Fourth Review Conference, as adopted at the final plenary meeting on 29 November 2019, accessed February 24, 2023, https://www.osloreviewconference.org/fileadmin/APMBC-RC4/Fourth-Review-Conference/Oslo-action-plan-en.pdf

THE STUDY

Aim

This study aims to provide a framework for mine action stakeholders to review the efficiency of their own land release operations, identify potential improvements, make evidence-based decisions and identify areas for improvement in a complex and dynamic context.

Greater efficiency is beneficial to individual mine action organisations and national programmes not only in terms of their operations and achieving land release,[9] but also in terms of the credibility and persuasiveness with which they can argue value for money, especially when they are funded by public funds.

Methodology

A purposive sampling method was used, meaning that operators and country programmes were deliberately approached. This reflects the realities of collecting data in the mine action sector whereby it is necessary to request data from the relevant stakeholders.

The mine action sector has recognised for some time that one of the challenges that it faces is standardising the way that key operational data is collected, recorded and reported. Annex B to IMAS 05.10: Information management for mine action sets out important minimum data requirements, including measurement units, for a range of data fields within a typical mine action information management system. However, it does not specify all details in terms of operational key performance indicators. As a result, not all organisations count and report data in the same way. This raises some challenges for a study of this kind.

The methodology used in the study is described more fully in Annex C.

Data

Sources

Data from 2015 to 2019 was requested to allow for a wide timespan while avoiding the consequences of the coronavirus disease pandemic on land release operations.

The data came from a number of sources, including:

- Operational performance data aggregated by year for national programmes, provided by 15 NMAAs, one donor and three intergovernmental agencies;
- Operational performance data from individual sites, provided by 9 operators (NGOs, national operators and commercial companies) in 17 countries (a total of 36 programmes and 10,121 task sites);
- Contextual, cost and yearly operational data collected through questionnaires,[10] provided by 10 operators (NGOs, national operators, and commercial companies, including local ones) from 19 countries (a total of 43 programmes);
- Additional contextual and performance data collected through visits, interviews and document reviews for two countries, Cambodia and Lebanon, chosen to be the focus of case studies;
- Open-source mine action information from the Landmine and Cluster Munition Monitor and Mine Action Review, including references to national treaty reports and implementation-deadline extension requests;
- Open-source data from the World Bank and International Labour Organization (country profiles);
- Information obtained by the GICHD in the framework of previous studies, research, assessments and field visits.

[9] Any efforts to improve operational efficiency should, however, never compromise the health and safety of those involved in the operations.

[10] Questionnaires were distributed and managed using the SurveyMonkey platform.

Quality

Some of the inconsistencies in data were addressed through requests to the providers to revisit their source information and through the triangulation of different data sources. In doing so, the research team was able to assemble a substantial body of data.

Key performance indicators

The KPIs chosen for the present study help provide an understanding of how resources can be used to maximise productive output, the relationship between individual asset productivity and overall operational efficiency, and the effect of land release decision-making and objectives on overall value for money.

The following key performance indicators are used in this study:

1. **Ratio of land cleared to land released**
   The efficiency of land release decision-making processes during the clearance process and as part of the surveys that led to the clearance.

2. **Square metres of land released per item of explosive ordnance found**
   The level of efficiency of the targeting of survey and clearance operations in the case of actual contaminated land.

3. **Square metres of land cleared per item of explosive ordnance found**
   The level of efficiency of the targeting of survey and clearance operations in the case of actual contaminated land.

4. **Cost per square metre of land released**
   The overall cost associated with releasing land.

5. **Cost per square metre of land cleared**
   The overall cost associated with releasing land.

6. **Cost per item of explosive ordnance found**
   The overall cost of finding each item of explosive ordnance.

7. **Deminer days spent per item of explosive ordnance found**
   The level of effort required to find each item of explosive ordnance.

8. **Square metres cleared / released per asset (deminer) per day**
   The level of effort required to release or clear land.

9. **Productive resource ratio**
   The proportion of deployed resources that can directly generate product (as opposed to those that perform enabling functions).[11]

10. **Productive time ratio**
    The proportion of deployed time that a potentially productive resource spends engaged in actual productive activity, as opposed to engaging in enabling activities, such as site preparation, vegetation clearance or quality assurance/quality control or on periods of suspension owing to climatic conditions or maintenance, etc.

11. **Productive cost ratio**
    The proportion of the cost of deployed resources associated with productive resources as opposed to enabling resources.

[11] Enabling and productive resources may be defined as follows: A productive resource is a human, animal or mechanical land release-related resource directly engaged in the physical processing of land for release. An enabling resource is a human or physical resource that carries out an activity needed to enable safe and effective action by the productive resources, but does not itself directly process land for release.

FINDINGS BY KEY PERFORMANCE INDICATOR

This section provides an overview of the main findings of the study. A more detailed examination of data from Cambodia and Lebanon in the form of case studies and comprehensive analysis of global trends can be found in annexes A and B. Additionally, annex D offers a comprehensive list of literature directly or indirectly related to the topic of operational efficiency in mine action.

KEY PERFORMANCE INDICATORS 1 TO 8

An anti-vehicle minefield in Logar Province in Afghanistan, where there are large suspected hazardous areas in remote locations, with little historical record of the minelaying and thus challenges associated with the availability of data. *Image: GICHD.*

1. Ratio of land cleared to land released

This KPI measures the efficiency of the land release process. The higher the value, the larger the proportion of released land that required clearance, which could indicate that a survey process was not conducted, not well targeted, or simply not required. Conversely, a smaller value means that only a small proportion of the released area required clearance. This could indicate either well targeted and efficient land release decision-making or upstream issues relating to the survey, which had led to large areas being suspected as hazardous and registered as such.

The ratio of cleared land to released land can be affected by decisions past and present. Early surveys that defined suspected hazardous areas too broadly can lead to large areas being cleared unnecessarily, and new reviews or surveys may lead to the release of large areas of land through cancellation.

Across all countries in the study, the average ratio of cleared land to released land, presented as a percentage, is 53 per cent. The highest values are in the Lao People's Democratic Republic, Vietnam and Afghanistan, which scored 100 per cent, 100 per cent and 91 per cent, respectively. This may indicate that their survey processes and clearance efforts were not as efficient as they could have been. Thailand and Angola, however, with scores of 2 per cent and 4 per cent, respectively, are at the other end of the scale, which suggests that their survey processes were prioritised over clearance during the period from which the data was taken. For example, in 2018 Thailand declared that it would focus on nontechnical survey during the period 2018–2020 in order to gain more precise information on the remaining mined areas.

Where the clearance process is driven by the needs of land users, such as in Colombia, the Lao People's Democratic Republic, Vietnam and Western Sahara, the ratio is often higher as the aim is to ensure that all areas are free of explosive ordnance. In some countries, the selection and prioritisation of clearance assets is driven by socio-economic, developmental, peacebuilding or security concerns.

The ratio of cleared land to released land can also be heavily influenced by the age of the mine action programme, the minelaying pattern and the type of mines laid. For example, earlier GICHD studies found that, in Afghanistan, 90 per cent of land was released through clearance and that 65 per cent of the remaining contamination was from anti-vehicle mines. This type of mine poses a significant challenge for efficiency in land release owing to the low density over very large areas of land. To locate an anti-personnel mine in Afghanistan, deminers clear on average 2,702 square metres of suspected hazardous land, while each anti-vehicle mine requires the clearance of an average of 71,679 square metres, which is 27 times more land per mine found. This means that large areas have been cleared at a high cost. For example, in 2019, 30 hazardous areas, each larger than 1 square kilometre, were cleared, with no mines found.

Over time, the use of more advanced survey and clearance methods and the ability to make more informed land release decisions through improved data analysis may result in a decrease in the proportion of land requiring clearance. Data from remote-sensing, for example, could be used to inform land release decision-making processes.

A border anti-personnel minefield in Lebanon. *Image: Lebanon Mine Action Centre.*

2. Square metres of land released per item of explosive ordnance found

This KPI is an indicator of the efficiency of the clearance process, as well as of the effectiveness and quality of the survey that directed the clearance assets, as it shows whether the areas being released actually contained any items of explosive ordnance. A higher value means that more land is being released per item of explosive ordnance found, which could indicate that the survey process was well targeted and efficient. Overall, the lowest value for the square metres released per item of explosive ordnance found is 55 and the highest value is 23,956. The average is 6,753 square metres. It is important to note that the values for this KPI are influenced by factors such as the type and density of contamination and the size and accessibility of the task sites.

The highest values for this KPI are found in Western Sahara and Thailand, with 23,956 and 17,661 square metres of land released per item of explosive ordnance found, respectively. The three countries with the lowest values are Tajikistan, Sri Lanka and Sudan, with 55, 121 and 261 square metres, respectively. As mentioned, this may suggest that these countries have well-targeted and efficient survey processes and clearance efforts; it may also indicate that the land release operations take place in areas of high contamination.

Countries with dense or barrier minefields, such as Lebanon and Zimbabwe, typically have lower values for this KPI, as do those that have been heavily bombed or targeted with cluster munitions, like the Lao People's Democratic Republic and Vietnam. Countries with longer-established mine action programmes, like Angola and Bosnia and Herzegovina, have typically cleared the most contaminated areas and are left with harder-to-define areas such as those affected by indiscriminate or nuisance mining. In some countries, like Angola or Thailand, resurvey programmes have resulted in large areas being released without further technical intervention.

Overall, the KPI of square metres of land released per item of explosive ordnance found is an important indicator of the efficiency and effectiveness of mine action efforts and can be used to identify areas for improvement and guide decision-making in mine action operations.

3. Square metres of land cleared per item of explosive ordnance found

This KPI indicates the efficiency and effectiveness of the clearance and survey process as it shows how well the survey teams have eliminated areas that do not need clearance efforts and how targeted the clearance efforts were when it came to locating ordnance.

The value for this KPI can vary greatly. For example, if the ordnance is in the form of wellrecorded, pattern minefields or cluster strike areas then the value is likely to be lower. If the ordnance is more irregularly distributed, such as in low-density minefields, the value may be higher.

The three countries with the lowest values for this KPI are Tajikistan, Sri Lanka, and Sudan, with 20, 76, and 76 square metres, respectively. This suggests that these countries have an efficient and effective clearance process.

The highest values for this KPI are in Western Sahara, Serbia and Croatia, with 4,524, 6,782, and 10,897 square metres, respectively. More detailed analysis of this KPI in annex A looks at the relationship between the number of mines found at a task site and the area cleared per item. It shows that, as the number of mines at a site increases, the number of square metres cleared per item decreases, likely owing to the concentration of mines in pattern or barrier minefields, which makes it easier for land release decision-makers to clear the area confidently. Nevertheless, this relationship could also be affected by other factors, such as incorrect contamination mapping. For example, during the present study the Serbian Mine Action Centre reported that the country was discovering previously unknown mine-contaminated areas. In these areas, the mines had not been laid in specific patterns, making the demining efforts more difficult, as the survey results could be subject to change, and the overall situation more complex. In any case, individual countries and sites should be studied in more detail with a view to understanding this relationship more fully.

A dense anti-personnel minefield on the Thai–Cambodian border. *Image: Thailand Mine Action Centre*

4. Cost per square metre of land released (in USD)

This KPI measures the cost efficiency of the land release process. A lower value indicates that less money is being spent per square metre of land released, which can suggest that the survey process and clearance efforts are efficient and well targeted. While the cost of releasing land is driven partly by the cost of the resources engaged in the process, in many countries it is driven strongly by policy and decision-making aspects. The differing proportions of land released through clearance, reduction and cancellation reflect the fundamental differences in the approaches to generating each type of output.

The countries with the lowest values for this KPI are Thailand, Cambodia and Vietnam, with $ 0.02, $ 0.22 and $ 0.28 per square metre of land released, respectively. The significantly lower value of $ 0.02 per square metre of land released in Thailand could be due to the fact that the country's data came from the Thailand Mine Action Centre, which was unable to provide salary data because that information falls under the purview of the Defence Ministry and its budget. The true cost of clearance efforts in the country is thus likely to be higher.

Rocky, difficult terrain in Sudan. *Image: National Mine Action Centre, Sudan*

The countries with the highest values for this KPI are Colombia, Lebanon and Sudan, with $ 47, $ 5.87, and $ 2.89 per square metre of land released, respectively. The extremely high value for Colombia could be due to the extreme challenges associated with its remote, hard-to-access and heavily vegetated task sites and the hard-to-detect nature of much of the home-made explosive ordnance. Colombia has known one of the longest and most intense armed conflicts in the world, in which there was the widespread use of landmines and other explosive ordnance. The value may also be explained by the dispersed nature of much of the contamination. Additionally, the peace process in Colombia is relatively new, and, as such, a mine action sector is still in the process of being established. This has required significant investment in infrastructure, capacity-building and technical assistance. Over the period under review, there was a noticeable downward trend in terms of the cost and an increase in the land released through clearance; the cost per square metre of land released decreased from $ 79 in 2017 to $ 20 in 2019, potentially owing to improvements in survey quality and a focus on ensuring the efficiency and effectiveness of land release operations.

After Colombia, Lebanon has the highest cost per square metre of land released at $ 5.87. Cambodia, however, has one of the lowest values at $ 0.22. This means that the average cost per square metre of land released in Lebanon is 26 times higher than in Cambodia. As part of the present study, the research team gathered additional data by visiting both countries. The team concluded that there were several factors contributing to the differences in cost. Some related to costs at the local level. For example, deminer salaries in Lebanon were five times higher than those in Cambodia, while the average salary of a site supervisor was three times higher; likewise, the cost of a team in Lebanon was six and a half times higher than in Cambodia. In terms of team composition, in Cambodia, for an average of nine deminers, three supporting staff were provided; in Lebanon, for the same number of deminers, five supporting staff were employed on site. One of the reasons for this difference relates to the medical staff. In Cambodia, one of the main operators employed deminers who were also medics, while in Lebanon all operators had to employ dedicated medics as the option of employing deminer medics was not yet available. Furthermore, the proportion of deminers and supporting staff was adapted according to the task characteristics.

Deminer at work in Tajikistan. *Photo credit © TNMAC*

5. Cost per square metre of land cleared (in USD)

This KPI indicates the cost-efficiency of the clearance process and the efficiency of the resources used for clearance. A lower value means that less money is being spent per square metre of land cleared, which can indicate that the clearance efforts are efficient and well targeted.

The three lowest values for this KPI can be found in Cambodia, Western Sahara and Vietnam, namely $ 0.37, $ 0.51 and $ 0.65, respectively. This is likely due to a combination of factors, such as lower labour costs and less challenging clearance conditions. The countries with the highest values are Colombia and Lebanon, with a cost of $ 101.85 and $ 10.65 per square metre of land cleared, respectively.

Clearing land is more expensive than reducing or cancelling it. If the values of the present KPI on the cost of land cleared are compared with those for the KPI on the cost of land released, the ranking of countries across the scale remains similar, but does include some substantial repositioning. The biggest changes are associated with countries that have very high ratios of land cleared to land released. It is important to note, however, that these high costs are not necessarily indicative of inefficiency; other KPIs can provide context for the efficiency of the land clearance operations. Additionally, there is some evidence of a direct link between the cost of a deminer and the overall cost of clearing a square metre of land.

The case of Croatia has been identified as deserving of further analysis when it comes to the cost of clearance. Croatia has a relatively low cost per square metre of land cleared, especially taking into consideration its higher cost of living and GDP per capita, if compared with other mine-affected countries. While the cost of clearance has risen slightly in recent years, which could be due to the remaining tasks being in difficult terrain, it has generally remained stable throughout the years, at around $ 1.23 per square metre of land cleared. The planning and decision-making process of the Croatian Mine Action Centre is often driven by geographical factors, and a method known as a 'supplementary non-technical survey' has been introduced to release land without using the resources required for larger-scale clearance. Additionally, the collaborative process used to allocate tasks may also affect cost efficiency in Croatia. The companies operating in the country form several consortia for each tender and take multiple factors into consideration, including the capacities of each member of the consortium and the location of its offices and deminers and the seasonal, environmental and topographical considerations related to each site. It allows for operations across the country not to be disrupted, with teams and assets deployed sequentially or continuously.

To optimise the use of resources in clearance operations, Tajikistan has implemented a practice whereby multidisciplinary teams can conduct non-technical survey and technical surveys simultaneously rather than sequentially. The simultaneous survey approach has also been found to increase confidence in the findings and to be a more efficient use of resources. While there is a broader discussion under way on whether such an approach should be applied more generally, it is particularly relevant when working in suspected hazardous areas that are sparsely populated and where the lack of informants can make it difficult to gather information through non-technical surveys, which are a crucial component of the land release decision-making process.

6. Cost per item of explosive ordnance found (in USD)

This KPI compares the resources invested (in USD) with the output or outcome achieved (in terms of items of explosive ordnance found). A lower value indicates that the mine action operation is more cost-efficient, as fewer resources are being invested to clear a larger number of items of explosive ordnance.

The cost per item of explosive ordnance item varies greatly between countries. Sri Lanka, Thailand and Zimbabwe have the lowest cost per item found at $ 274, $ 281 and $ 289, respectively. Colombia, Croatia and Serbia, however, have the highest cost per item found at $ 177,920, $ 13,450 and $ 9,757, respectively.

There are several factors that might contribute to the high cost per item of explosive ordnance found in countries such as Colombia. These include: the complexity and severity of the mine problem; the accessibility of and the type of terrain in the affected areas; and the security situation in the country. This makes clearance efforts more challenging and costly. Furthermore, improvised explosive devices have been planted by non-State armed groups, and there is a need to provide security for clearance teams in high-risk areas, which may also contribute to the high cost.

In other countries, such as Croatia and Serbia, the high cost per item of explosive ordnance found could be due to the fact that they are approaching the final stages of their mine action programmes and are focusing their resources on finding and removing the remaining contamination. The majority of the remaining tasks are in difficult terrain and with fewer items remaining, which is likely to make the process more costly.

The clearance of land without any explosive ordnance being located significantly increases the cost per item. Data collected from 10,121 task sites showed that in 26 per cent of the tasks where clearance was the dominant land release method (used for 75 per cent or more of the total land released) no items of explosive ordnance were reported found. The value per country varied enormously, however, with some countries reporting that 45 per cent of completed tasks contained no explosive ordnance. Some countries, such as Afghanistan and Sri Lanka, have a lower incidence of land clearance without the discovery of any explosive ordnance owing to a combination of experience and greater availability of information, as well as the extent of the contamination. The simultaneous non-technical and technical survey approach implemented in Tajikistan should be considered by countries that experience instances of land clearance not leading to the discovery of explosive ordnance.

7. Deminer days spent per item of explosive ordnance found

This KPI provides an indication of how much time is spent clearing land that contains explosive ordnance. Clearance operations that cover large areas containing few items of explosive ordnance produce higher values. This KPI cannot be used in relation to sites where no items are found as the result would be an infinite value. In the present study, 32 per cent of the sites, for which data was made available, reported that no explosive ordnance had been found. Land release resources are expensive to train and deploy. In order to maximise value for money, a proper survey process is important to decrease the chance of deploying costly clearance resources in areas where there are no hazards.

Analysis of 1,681 data points from 15 countries showed that, in 75 per cent of the cases fewer than 125 deminer days were spent per mine found, with 40 deminer days or fewer per mine spent in 25 per cent of the cases. For a team of 8 deminers, 40 deminer days equals 5 team days. This means that at 25 per cent of the sites a team would expect to find at least one mine each working week and, at 15 per cent of sites, teams would expect to find a mine every day or two.

At sites with large numbers of mines, the reality is that there will be periods when mines are found frequently, several times a day, by each deminer and other periods when few or no mines are found, particularly during the initial technical survey or when the clearance of buffer or fade-out zones is undertaken.

With regard to the extreme values found during the conduct the study, a typical working year consists of around 220 days; for a demining team consisting of 10 deminers, a working year is thus about 2,200 deminer days. Several sites reported that more than a ‘team year’ had been spent working to find each mine. The highest figure showed almost three team years of work to find one mine. After further discussions with operators, the extreme values produced in the analysis were found to be due to operators expecting to find a larger pattern of mines than they did.

A marked confirmed hazardous area in Croatia. *Photo credit © GICHD*

8. Square metres cleared per asset (deminer) per day

This KPI shows the rate at which output is generated. In the present study, productivity rates are presented as either 'square metres cleared per deminer per hour' or 'square metres cleared per deminer per day', with a day equating to six hours for comparative purposes. Although the same type of analysis can be applied to animal detection and mechanical systems, the present study focused on human productivity.

The most common productivity rate was between 20 and 25 square metres per deminer per day. Higher figures, including those in the hundreds and even thousands of square metres per day are associated with battle area clearance. Lower values were associated with tasks relating to the clearance of mines or cluster munition remnants.

The integration of different methodologies can greatly enhance the average number of square metres cleared per deminer day. This has been the case in Croatia where there was a strong focus on the use of both machines and mine detection dogs.[12] This was reported to have substantially increased operational productivity.

There can be significant variations in the average daily deminer productivity figure over the lifetime of a single clearance site. Site set-up periods, when there may be interruptions to work and the time is needed for deminers to become familiar with the site and its conditions, typically result in reduced rates, but this is followed by an increase in productivity. Then there are external considerations. In one particular case in Lebanon, work started in favourable autumnal conditions before continuing through the winter, when poorer weather had an impact, and the task was completed early the following spring.

In a separate study on gender and operational efficiency carried out by the GICHD in 2021,[13] it was found that there was no significant difference in terms of operational productivity between men and women working in technical survey and clearance operations.

[12] "Analysis of the request submitted by Croatia for an extension of the deadline for completing the destruction of antipersonnel mines in accordance with article 5 of the Convention," APLC/MSP.9/2008/WP.18, October 30, 2008, accessed February 24, 2023, https://www.apminebanconvention.org/fileadmin/_APMBC-DOCUMENTS/Meetings/2008/9MSP-Croatia-Analysis-en.pdf.

[13] Raphaela Lark, David Hewitson and Dominic Wolsey, "Gender and Operational Efficiency," The Journal of Conventional Weapons Destruction 26: no.1 (2022), accessed February 24, 2023, https://commons.lib.jmu.edu/cisr-journal/vol26/iss1/7/.

SUMMARY OF FINDINGS FOR KEY PERFORMANCE INDICATORS 1 TO 8

Table 1 gives an overview of the results for KPIs 1 to 6 using data received from NMAAs. It shows the average value for the key performance indicators across the five years 2015–2019 for the 17 countries and territories that provided complete data. The measurement of the KPIs at the country level enables the comparison of performance, not necessarily between the countries, particularly given their vastly varying individual contexts, but between the KPIs.

Table 1: Average values for the key performance indicators 1 to 6 for the years 2015–2019 for countries that provided complete data

	KPI					
	1	2	3	4	5	6
Country/territory	Ratio of land cleared to land released	Square metres of land released per item of explosive ordnance found	Square metres of land cleared per item of explosive ordnance found	Cost per square metre of land released	Cost per square metre of land cleared	Cost per item of explosive ordnance found
Afghanistan	91%	1,218	1,008	$ 0.79	$ 1.48	$ 911
Angola	4%	15,773	385	$ 0.32	$ 7.88	$ 9,042
Cambodia	55%	3,360	1,830	$ 0.22	$ 0.37	$ 678
Colombia	51%	3,564	1,784	$ 47.00	$ 101.85	$ 177,920
Croatia	84%	13,195	10,897	$ 1.03	$ 1.23	$ 13,450
Iraq	37%	7,794	1,834	$ 0.81	$ 1.32	$ 4,437
Lao People's Democratic Republic	100%	394	394	$ 0.99	$ 0.99	$ 356
Lebanon	61%	349	252	$ 5.87	$ 10.65	$ 2,204
Serbia	62%	8,793	6,782	$ 1.07	$ 1.96	$ 9,757
South Sudan	35%	4,956	1,020	$ 0.49	$ 4.07	$ 3,771
Sri Lanka	62%	121	76	$ 2.26	$ 3.65	$ 274
Sudan	60%	261	76	$ 2.89	$ 5.78	$ 457
Tajikistan	41%	55	20	$ 1.29	$ 1.98	$ 1,721
Thailand	2%	17,661	199	$ 0.02	$ 2.25	$ 281
Vietnam	100%	811	810	$ 0.28	$ 0.65	$ 500
Western Sahara	83%	23,956	4,524	$ 0.41	$ 0.51	$ 2,183
Zimbabwe	21%	378	77	$ 1.89	$ 4.49	$ 289

Table 2 contains a summary of the lowest, highest and average values for the same six KPIs. The results for Colombia were not included for certain KPIs owing to their values being significantly higher than those of the other countries/territories in the study, which had a significant impact on the average values. These differences are further examined above and in the annexes, where relevant.

Table 2: Summary of results, ranges and average values for the key performance indicators 1 to 6.

KPI		LOWEST VALUE	HIGHEST VALUE	AVERAGE VALUE
1	**Ratio of land cleared to land released**	2%	100%	56%
2	**Square metres of land released per item of explosive ordnance found**	55	23,956	6,192
3	**Square metres of land cleared per item of explosive ordnance found**	20	10,897	1,887
4	**Cost per square metre of land released**	$ 0.02	$ 5.87	$1.29
5	**Cost per square metre of land cleared**	$ 0.37	$10.65	$3.08
6	**Cost per item of explosive ordnance found**	$ 274.00	$13,450.00	$3,144.00

Table 3 shows the summary of the overall results for KPIs 7 and 8. Together, these two KPIs provide an insight into the efficiency and productivity of deminer efforts. It is important to note, however, that using country-specific data to establish global KPIs carries a number of risks. The context and conditions of land release operations vary greatly between countries, making it difficult to make meaningful comparisons. For example, a country with a higher level of contamination may have a lower value for the number of square metres cleared per deminer per day than a country with a lower level of contamination, but this does not necessarily indicate that the deminers in the first country are less efficient. Factors such as the type of explosive ordnance, the terrain and the availability of resources can also greatly impact performance in mine clearance operations. Furthermore, although the data presented in the table is an average of the results obtained from a substantial sample of mine action operations, it is not a comprehensive representation of all data points.

KPI		MOST FREQUENT VALUE (MODE)	CUMULATIVE PROPORTION OF RESULTS		
			25%	50%	75%
7	**Deminer days spent per item of explosive ordnance found**	57.5	up to 40	up to 67.5	up to 125
8	**Square metres cleared per asset (deminer) per day**	22.5	up to 32	up to 60	up to 300

Table 3: Summary of the results for key performance indicators 7 and 8.

An average deminer in Tajikistan clears 25 square metres per day in difficult terrain. *Image: Tajikistan National Mine Action Centre*

KEY PERFORMANCE INDICATORS 9 TO 11

During the field deployments to Cambodia and Lebanon for data collection for the case studies, a number of productive resource ratios were explored. These indicate the efficiency with which the resources that are capable of producing released land (i.e. deminers, animal detection systems, mechanical systems, etc,) are deployed and employed.

9. Productive resource ratio

Productive resource analysis looks at the proportion of resources available on site that are capable of delivering output, in this case land. Productive resources are typically deminers. Although animal detection systems and some mechanical systems can deliver output on their own, it is more common for such systems to support and accelerate the progress of human deminers. Enabling resources are those, such as supervisors and medical and logistical support personnel, that are necessary on site to ensure safe and reliable operations, but which do not generate output themselves. It is important to be clear that the enabling resources perform important functions, but in terms of operational efficiency they are not 'productive'.

The results across a variety of sites in the two countries ranged from 30.7 to 81.8 per cent.

The different management policies adopted by mine action organisations have a significant impact on the productive ratios. In Cambodia and Lebanon, individual organisations were free to adopt whichever approaches they preferred. Although there is no single right answer regarding how to deploy demining teams, it is important that mine action managers are aware of the productive ratio and of the decisions they can take to ensure that the potentially productive capacity is used to best effect. This, however, should never be at the cost of compromising safety.

Some of the constraints faced by managers, such as in relation to the geographical size of the task, the type of terrain or the nature of contamination, that impose safety separation restrictions on the number of deminers that can be deployed are reflected in the IMAS. The IMAS 10.40 state that there may be areas where it may not be practical to provide dedicated first aid or medical staff to small demining teams, which may be required to operate independently and in remote locations over extended periods. In such cases, the IMAS prescribe that demining organisations shall ensure that the small demining team has employees with first-aid training, the resources needed to respond to a demining accident, and sufficient staff to manage and implement an appropriate emergency response procedure (see also KPI 4).

During some of the interviews, mine action organisations reported challenges when it came to amending operational plans if they were linked to a specific grant or contractual agreement. In some cases, amendments to the work plans had to be submitted to the donor concerned before clearance could continue, which caused delays and increased downtime. In some cases, the transfer of personnel to sites where teams funded by other donors were working was reportedly not allowed.

Some current contracting methods provide a target of square metres or a specific area to be cleared. While such a contract modality may have advantages in areas where the hazard boundaries are well known, it could prove counterproductive in areas where hazard boundaries are less well defined, as there is little incentive for the mine action organisations to use their assets more efficiently. If an organisation is being paid to clear a certain number of square metres, it will do exactly that, potentially with less effort put in to determining whether a hazard exists in a suspected area.

10. Productive time ratio

During the case study investigation at a site in Lebanon, the number of deminer hours spent in output generating clearance work was assessed in relation to the number of deminer hours available at that site each day. The mine action organisation concerned applied the normal policy of a six-hour working day. The analysis used data extracted from the daily diaries kept at the site.

On average, 51 per cent of the time theoretically available to the deminers was spent on clearance activities. The highest value found was 73 per cent and the lowest was 3 per cent. Over the course of the task, there was a slight increase in the average productive time ratio. It is important to note that these figures are simply an example of the productive time ratios recorded at one site. The present study does not propose a particular approach to site management, nor is it suggesting that there are benchmarks or targets that mine action organisations and authorities should pursue. There are many circumstantial reasons why it will not always be possible to achieve the highest levels of productive efficiency, but what is important is that mine action managers remain aware of the situation and the impact of their decisions on operational efficiency. The 2021 GICHD study on gender and operational efficiency also demonstrated that there was no significant difference in the availability of men and women to work.

11. Productive cost ratio

This KPI measures the proportion of the cost of a deployed team that is associated with productive resources in comparison with enabling resources. The use of productive cost ratios provides managers with another metric to help them understand the implications of how resources are allocated and how that their allocation affects operational efficiency. Undoubtedly, when using the KPIs, managers should ensure that safety is not compromised in their decision-making. This is part of ongoing risk management procedures where managers accept a tolerable level of risk and are confident that the risk is worth taking and that it is properly mitigated.

Cambodia and Lebanon were selected for the case studies partly because their values for KPI 4, 'cost per square metre of land released', were at the opposite ends of the scale of the countries covered by the study. The difference in underlying costs (particularly salaries) goes some way to explaining the overall differences.

Table 4 gives an illustrative comparison of key cost data and ratios for the two countries. The results are the average values taken from two mine action organisations in Cambodia and four in Lebanon.

There are many good reasons why it is sometimes impossible to avoid reduced efficiency in operations when responding to external factors over which managers have no control. Although this is the case, mine action managers should be clear about the cost efficiency implications of the various responses that they may choose to adopt.

Indicator	Cambodia	Lebanon	Difference
Cost per item of explosive ordnance found (KPI 6) in USD	$ 678	$ 2,204	3.3 times
Cost per square metre of land released (KPI 4) in USD	$ 0.22	$ 5.87	26.7 times
Cost per square metre of land cleared (KPI 5) in USD	$ 0.37	$ 10.65	28.8 times
Deminer salary in USD	$ 279	$ 1,363	4.9 times
Site supervisor salary in USD	$ 594	$ 1,849	3.1 times
Team enabling resource cost as a percentage	28%	34%	_
Team productive resource cost as a percentage	72%	66%	_

Table 4: Comparison of key cost data and ratios for Cambodia and Lebanon.

KEY OBSERVATIONS

Operational efficiency in mine action is a complex and multifaceted issue. While some factors, such as local economic influences and physical circumstances, are beyond the control of individual mine action organisations, many aspects can be influenced by management action, which can demonstrate efforts to improve the value for money offered by an organisation.

As mentioned in the disclaimer, the data in this study is accompanied by contextual information on known factors that might have affected the results, and no country should be considered as having a 'good' or 'bad' performance in terms of operational efficiency purely on the basis of the KPI values.

It should also be noted that the data used in this study was sufficient for the immediate purpose, but not all the data met the criteria for inclusion and there were inconsistencies in the data stemming from different sources within the same country. Furthermore, it is important to note that the study does not intend to provide in-depth analysis of every country measured for each KPI.

To improve overall understanding of operational efficiency and management, it is essential that analysts, managers and other users of KPIs have access to consistent, accurate and timely information. Some aspects of mine action data management have already been defined in the IMAS, but the management of many of the data required for operational efficiency KPIs has not.

The KPIs used in the study are better suited for use at some levels and contexts than others. The KPIs related to released land, for example, have more value as a higher-level strategic or programmatic level, as they provide an overview of the relationship between total inputs (programme funding for instance) and total outputs (land released by all methods). They are of less use when analysing the more technical dynamics of daily operations when the very different products of land release activities all come into play. Clearance is activity-driven, reduction is both activity- and decision-driven, while cancellation is almost entirely decision-driven. Released land ratios are also heavily influenced by the implications of previous activities. In particular, countries that engage in the resurvey of suspected hazardous areas that had been established during earlier non-technical surveys or landmine impact surveys often generate very large areas of cancelled land, temporarily distorting the associated KPIs. Clearance KPIs are better suited to the understanding of how the more expensive land release activities are targeted and the costs associated with them. Because clearance is an activity-driven process, it lends itself more obviously to the relationships between measurable levels of effort (such as deminer days) and the level of output achieved.

Productive ratios (of resources, time and costs) provide a means for mine action managers to consider how they should be organising activities to enable as much productive output generation as possible, while balancing the need to ensure safe operations and adequate command and control of task sites.

It is vital to consider multiple KPIs when evaluating the efficiency of land release and clearance operations as each KPI will measure a different aspect of the process. For example, KPI 5, 'cost per square metre of land cleared', and KPI 6, 'cost per item of explosive ordnance found', can give an insight into the financial efficiency of the operation, but when used in isolation they do not provide a comprehensive understanding of its overall efficiency or effectiveness. In contrast, KPIs 2 and 3, 'square metres of land released/cleared per item of explosive ordnance found', measure the amount of land that was cleared or released per single item of explosive ordnance. By combining these two sets of KPIs, a more complete understanding of the operation can be obtained.

As an example, the cost of clearance and land release in Lebanon is relatively high compared with other countries ($ 5.9 per square metre released and $ 10.7 per square metre cleared). That said, if compared with the cost of clearance and land release in other countries, the mine action programme in Lebanon is able to clear and release a smaller amount of land per item of explosive ordnance found (252 square metres and 349 square metres. respectively) while implementing the full land release process, including a balanced non-technical survey, technical survey and clearance approach (with 61 per cent of land cleared). This suggests that, in terms of the use of resources and achievement of the goal of releasing land from explosive ordnance contamination, the country's clearance efforts may be more effective than countries with lower costs per square meter, but which do not eliminate the immediate threat.

Collectively, the concepts and KPIs presented in this study provide a framework for increasing awareness and understanding of the dynamics of operational efficiency among mine action managers and other relevant actors. Action to improve the value for money offered by mine action begins with an awareness of the opportunities that managers have to influence operational efficiency.

Uncertainty has an impact on mine action and affects the sector's collective willingness to engage on the subject of operational efficiency. The fear that the measuring of KPIs will lead to unfavourable comparisons among organisations can lead to a reluctance to engage on a topic that is of the utmost professional importance. The use of a combination of anonymised, aggregated KPIs offers the potential for mine action managers to compare their own organisation's performance against averages or ranges of values relating to other organisations engaged in similar activities in specific countries. Policies to anonymise some of the data can be used to encourage greater transparency where necessary, but, in many cases, data quality issues will be corrected as authorities and mine action organisations start to make more use of the data to analyse their own performances. One of the observations of this study was that more and more mine action stakeholders are collecting relevant data and are storing it digitally. The next step will be to see how that data can be used to its fullest potential.

RECOMMENDATIONS

The following section provides a series of recommendations for improving the efficiency of land release operations. These recommendations are based both on the findings of the study and on the experience gained while conducting it. They are intended to provide guidance for both mine action organisations and governments.

The recommendations are grouped into categories, and each recommendation is accompanied by a brief explanation of its rationale and potential impact on the overall efficiency of operations. The recommendations are intended to be flexible so that they can be adapted to different contexts, and they should be considered in conjunction with the specific circumstances and priorities of each individual operation.

Data collection

Recommendation 1.

Mine action stakeholders should enhance their collection of relevant data. A review of Technical Note 07.11/02: Key Performance Indicators (KPIs) for Land Release and Stockpile Destruction Operations and of IMAS 05.10: Information management for mine action should be undertaken with a view to including details on the collection and analysis of data relevant for the measurement of key performance indicators related to cost. The minimum data requirements in annex B to IMAS 05.10 should be expanded.

It became apparent during the conduct of the present study that the full dataset needed to measure operational efficiency was often unavailable, contained mistakes or was inconsistently gathered, including owing to the use of non-standard and varying methodologies. This made it challenging to conduct consistent and comparable analysis. It is thus crucial for mine action stakeholders to establish and follow standardised procedures for data collection and reporting.

The IMAS are an important vehicle for the standardisation of data collection and analysis methods for the most important and widely applicable mine action KPIs, but they are not the only mechanism. By working with the Information Management System for Mine Action, advisers, developers and managers can help establish automated systems for the presentation of KPI measurements in dashboards. As most national mine action standards do not contain minimum data requirements, ongoing drafting and updating initiatives should consider their inclusion.

The importance of higher-level cost KPIs has been demonstrated in this study. The inconsistencies in the way that costs are counted limit the value that can be extracted from the relevant KPIs. Improved guidance on the collection and reporting of a limited number of data points, combined with reassurance about their use, will help make cost KPIs more telling.

Use of key performance indicators

Recommendation 2.

Mine action stakeholders should encourage greater use of the KPIs in Technical Note 07.11/02: Key Performance Indicators (KPIs) and the development of additional ones that can help improve understanding of operational efficiency and support the communication of the value for money offered by a mine action operations. NMAAs and mine action organisations can use the conceptual framework set out in the present study, including the key performance indicators, as a basis for demonstrating the results of their efforts to improve the value for money that they offer.

Some mine action organisations already measure KPIs and maintain dashboards for operational performance management. Others should be encouraged to do so in an effort to ensure continual improvement both within their organisations and throughout the sector as whole.

KPIs, including those in the present study, along with conceptual frameworks and other tools herein, can help NMAAs and mine action organisations explain more clearly the impact of the conditions under which they operate on their operational efficiency. They can also be used to explain how the policies and methods applied by organisations can be expected to lead to improvements in operational efficiency and thus the overall value for money that they offer. In order to maximise these results, NMAAs and mine action organisations should consider the establishment of a joint national KPI framework within a given country/context.

Recommendation 3.

Managers should use KPIs to better inform their decision-making processes in order to ensure that the principle of 'all reasonable effort' has been applied in situations where the commitment of additional resources might be considered unreasonable in relation to the results expected.

This recommendation is especially pertinent, given that a considerable proportion of suspected hazardous areas is being cleared without any explosive ordnance being found. This of course has a significant negative effect on the cost per item.

Information was collected from various stakeholders about their perceptions of the concept of all reasonable effort. The results varied significantly with regard to the extent to which the concept was defined and applied within the given country.

As stated in Technical Note 07.11/03: All Reasonable Effort (ARE), the concept of all reasonable effort identifies the need for efforts guided by a reasoned approach based on evidence to ensure that contamination is identified and cleared without wasting time and resources. The technical note contains a good practice checklist to ensure that a mine action programme can be confident of having expended an acceptable level of effort to address its explosive ordnance problem. Examples of good practices include the setting up of an information system that manages land release information and provides the evidence of 'reasoned' decisions during the land release process; the establishment of an internal information management system that can record, store and analyse information using all appropriate means of evidence triangulation, in support of documented decision-making; and regular engagement with the NMAA regarding ways to improve data on explosive ordnance contamination and land release.

As noted under KPI 7, the simultaneous non-technical and technical survey approach implemented in Tajikistan should also be considered by countries that experience instances of land clearance not leading to the discovery of explosive ordnance.

Recent assessments by the GICHD in a number of countries have indicated the use of several practices that contribute to reinforcing the application of all reasonable effort at the national level. These practices may render the use of operational resources more targeted and therefore lead to more efficient operations overall.

Performance management and capacity-building

Recommendation 4.

Mine action stakeholders should invest in the further development of their capacities in terms of operational efficiency management as part of broader management training and professional development programmes.

It became clear during the conduct of the study that data was not always collected or used optimally for operational efficiency management and that capacity-building was required in this regard. Annex B to the present study provides a basis to help mine action managers and monitors identify factors that influence their operational efficiency. Stakeholders should be encouraged to consider, as a matter of course, measures that can be implemented to mitigate the effect of context-specific factors on operational efficiency and to adopt practices and approaches that can enhance it. The instilling of this reflex in managers and monitors can be done through training, wider professional development, during monitoring efforts and through the efforts of technical working groups and other similar fora.

Recommendation 5.

The use of KPIs should be promoted in training courses on non-technical survey, including in relation to the implications of the definition of suspected hazardous areas and confirmed hazardous areas for the efficiency of land release, and on quality management.

Given that, as noted under KPI 1, released land ratios are heavily influenced by the implications of previous activities, particularly earlier non-technical surveys, the need to avoid the inclusion of unjustified or otherwise excessively large areas within the bounds of suspected hazardous areas should be made clear during training courses. This should help lead to greater consistency and comparability between organisations and programmes and over time. Suspected hazardous areas in national databases that may be larger than justified should be subject to further review and full or partial cancellation, as appropriate. National database managers should be aware of the distorting effects that the large downsizing of historical suspected hazardous areas has upon associated KPIs and therefore include additional explanations in reporting on treaty implementation and for donors.

Research

Recommendation 6.

Research on the effectiveness of land release operations should be undertaken.

The present study deals with efficiency in land release operations and how to maximise results using a minimum of resources. This is only part of the equation, however. As a complement, a similar study focusing on the effectiveness of land release operations is essential in order to better understand the outcomes and overall impact of land release operations, which include the impact on the lives of beneficiaries.

Having research and concrete data on both the efficiency and effectiveness of land release operations will enable the mine action sector as a whole to ascertain whether its interventions are leading to outputs and outcomes that benefit all relevant stakeholders. Such comprehensive, evidence-based results would strengthen the case for continued mine action interventions and commitments by diverse stakeholders to support these interventions.

Policymaking

Recommendation 7.

Donors should consider adapting their policies or reviewing the contractual modalities governing the allocation of financial resources between tasks and teams in order to reduce impediments to the management of operations and the improvement of operational efficiency.

A margin of flexibility in the allocation of resources during land release operations is essential in order to enable operators to respond to evolving needs and priorities as operations are under way.

As noted under KPI 9, there was a perception among the interviewees in the case studies that certain donor policies on the movement of mine action resources between tasks and the contracting modalities have an impact on operational efficiency. The challenge is to provide a contract model that encourages the release of land through survey as well as clearance and that provides incentives for both methods when appropriate. For example, a contract could be based on a specific capability (non-technical survey, technical survey, manual and / or mechanical demining), with the identification of areas for the relevant land release activities left to the NMAAs or operators to manage.

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