



Annual Report

[Translation from the Swedish original]

Financial Year 2017

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Contents

FINANCIAL YEAR 2017	1
1. FOCUS OF OPERATIONS	4
1.1 Tasks	4
1.2 Provisions that regulate SHK's operations	4
2. RESULTS	5
2.1 Structure of the Results section.....	5
2.2 Objectives	6
2.3 Operational development	6
2.3.1 Overall assessment	6
2.3.2 Investigation of accidents and incidents	8
2.3.3 Other safety-related activities and collaboration with other bodies	27
2.3.4 Human resources	28
2.3.5 Efficiency and sound economic management	34
2.3.6 Costs in total figures	38

1. Focus of operations

1.1 Tasks

The Swedish Accident Investigation Authority (Statens haverikommission, SHK) has the task of investigating serious accidents and incidents in aviation, maritime transport, rail transport, road transport, and other accidents or incidents, all from a safety perspective. “Other accidents or incidents” include all other activities in society that cannot be classified as aviation, maritime transport, rail transport or road transport. SHK’s investigative duties cover both civilian and military activities.

SHK also cooperates with the relevant safety authorities in their effort to prevent accidents, as well as with other countries’ accident investigation authorities and certain international bodies that work in this field such as the European Aviation Safety Agency (EASA), the European Maritime Safety Agency (EMSA) and the European Union Agency for Railways (ERA).

The purpose of SHK’s investigations is to

- clarify, as far as possible, the sequence of events and their causes, as well as damages and other consequences,
- provide the basis for decisions aiming at preventing similar events from occurring in the future, or limiting the effects of such events, and
- provide a basis for an assessment of the operations performed by the public emergency services in connection with the event and, if there is a need, for improvements to the emergency services.

The sole purpose of SHK’s operations is to improve safety. The authority has no other inspection remit, nor is it any part of its task to deal with issues of blame, liability, damages or matters of certification, disciplinary measures, etc. This means that such matters are neither investigated nor discussed in connection with an investigation.

1.2 Provisions that regulate SHK’s operations

SHK’s operations are primarily regulated by the Accident Investigation Act (1990:712), the Accident Investigation Ordinance (1990:717), the Ordinance (2007:860) with instructions for SHK, as well as Regulation (EU) No 996/2010 of the European Parliament and of the Council on the investigation and prevention of accidents and incidents in civil aviation, and Commission Regulation (EU) No. 1286/2011 on adopting a common methodology for investigating marine casualties and incidents.

Also of great importance to the investigations are Directive 2009/18/EC of the European Parliament and of the Council

establishing the fundamental principles governing the investigation of accidents in the maritime transport sector (the Maritime Accident Investigation Directive), and Directive (EU) 2016/798 of the European Parliament and of the Council on railway safety (the Railway Safety Directive), as are Annex 13 of the Chicago Convention¹ and the IMO Code².

2. RESULTS

2.1 *Structure of the Results section*

General

SHK's report is divided into the following sections: civil maritime transport, rail, civil aviation, military, and other accidents or incidents.

SHK has chosen to report statistics pertaining to the past three years; first in total and then for each investigation area. This is followed by a more detailed commentary on the statistics and other circumstances that have a bearing on the fulfilment of the authority's objectives.

Statistics pertaining to the total number of cases received and concluded, as well as the opening and closing balance (backlog), the number of cases in which a decision was made to launch an investigation or to carry out a formal preliminary assessment (applies only to maritime occurrences), the number of final reports and the extent to which it was possible to establish the probable cause of accident, the number and proportion of final reports produced within twelve months and the mean and median times to conclude the investigation in months, are provided for each area. Furthermore, the report includes the number of ongoing investigations at the end of the year, the percentage of these that had then exceeded 12 and 18 months respectively, as well as the mean and median investigation times in months for the investigations that were ongoing at that point in time. Finally, a report is given of SHK's assessment of the responses to its safety recommendations received over the course of the year.

“New cases” are all occurrences reported to SHK over the course of the year. “Concluded cases” are all such cases that SHK has closed over the course of the year. “Investigations commenced” denotes the occurrences that SHK has decided to investigate over the course of the year, and “final reports published” denotes investigations concluded over the course of the year for which final reports have been published.

¹ The Convention of 7 December 1944 on International Civil Aviation, Annex 13, which contains international standards and recommended practices for the investigation of accidents and incidents in civil aviation.

² The International Maritime Organisation (IMO) Code of International Standards and Recommended Practices for a Safety Investigation into a Marine Casualty or Marine Incident (Casualty Investigation Code).

With regard to foreign investigations in which SHK has participated but where the investigation was or is led by the investigatory authority of another state, only the number of new cases and concluded cases and the opening and closing balances are reported.

Incidents

In this context, it should be noted that incidents are not reported separately from accidents. The reason for this is primarily that it is often purely down to chance whether an occurrence has had such consequences as would lead it to be classified as an accident or as an incident in accordance with the law. In many cases involving minor accidents, there are often circumstances which mean that the occurrence can also be considered a near-miss in terms of a larger, serious accident.

Handling of safety recommendations

Safety recommendations are only reported for investigations led by SHK. The number of safety recommendations that SHK has made over the course of the year is stated here, along with the number of responses deemed by SHK to be satisfactory and not satisfactory, respectively, as well as the opening and closing balance. A recommendation response is considered satisfactory if the purpose of the recommendation is considered fulfilled, even if the addressee of the recommendation has chosen another way to implement the recommendation. That a recommendation response has not been deemed satisfactory means the addressee has adopted a final position on the recommendation and decided not to take any action in response to it, or in any case no action that SHK deems appropriate, or that the addressee has not provided a response to the recommendation within the prescribed deadline and SHK has determined that keeping the case open serves no purpose.

2.2 Objectives

The investigations of accidents and incidents carried out by SHK are to be concluded without delay, if possible within twelve months of the accident or incident taking place. They shall as far as possible clarify the causes of the accidents and incidents that SHK has decided to investigate and where applicable provide a basis for safety improvement measures and improvements to the public emergency services.

2.3 Operational development

2.3.1 Overall assessment

SHK's overall assessment is that its operations have continued developing in a positive direction and that the authority has generally fulfilled its objectives in 2017, while there is still room for improvement in terms of investigation times, primarily with regard to

military investigations. SHK's cooperation with the relevant safety authorities, other countries' investigation bodies and international bodies active in this field functions well overall and is being continuously developed.

Operations are almost entirely governed by events. New accidents and incidents demand a rapid response in the initial phase, both to enable an accurate assessment of whether or not they are to be investigated and to ensure that no investigation material is lost. In turn, this repeatedly leads to ongoing investigations having to be put aside. One consequence of this is that investigation times can be difficult to predict. In some cases, primarily those with international involvement, they can also be difficult, even impossible, to influence on the part of SHK. Consequently, it is not always "possible" to conclude an investigation within twelve months of the occurrence. Naturally, this does not prevent SHK from constantly having to actively strive to achieve this objective. SHK's assessment is also that the efforts that have been made and continue to be made in this regard have brought SHK gradually closer to this objective. Comparison with the investigation times at other states' safety investigation authorities shows that SHK is performing very well. The challenge for the future will be to ensure the sustainable maintenance of this level of performance.

Measures to improve the planning and follow-up of investigations have been implemented. Since 2016, SHK's operational plan has contained the objective that at least 80 per cent of SHK's investigations are to be concluded within twelve months and that no investigation is to take longer than 18 months. Since 2017, there has also been a goal for the mean investigation times not to exceed twelve months within any of SHK's investigation areas, taken separately, and the joint ambition is to maintain a good margin to the twelve-month limit.

The work to introduce a comprehensive operations management system is almost complete. The process-based operations management system has been designed to meet the authority's needs and, among other things, improves the conditions for conducting operations in a uniform manner. A new investigations handbook common to all transport modes has been finalized in 2017, and this should help to increase efficiency in the investigative work. The same is true of the investigation plans that are to be prepared at the initial stage of every investigation, which have been revised in 2017.

SHK's operational area is wide and the Ordinance (2007:860) with instructions for SHK contains requirements as to the human resources expertise that SHK must have in place. Investigators have a high level of specialist expertise within their fields, which means that they are only capable of standing in for one another in a limited capacity. This makes SHK's supply of staff vulnerable. At the same time, many of SHK's investigators possess competence that is of use across the

transport modes and investigation areas. The work to better cross utilise such competence at the authority has continued to develop positively in 2017.

SHK is facing a number of retirements in the coming years. Work to recruit replacements has begun, but there is a risk of losing expertise when experienced investigators retire.

2.3.2 *Investigation of accidents and incidents*

Authority-wide results

The following section contains an account of SHK's authority-wide results with regard to new cases and cases that have been concluded, investigations that have been commenced, final reports that have been published, investigation times, issued safety recommendations and assessments of the responses thereto.

Table 1. The number of cases received and concluded (including those led by another state).

Year	2015	2016	2017
Opening balance	59	48	41
New cases	415	413	418
Concluded cases	426	420	423
Closing balance	48	41	36

The number of new cases has increased marginally compared with 2016 and 2015. The total closing balance of cases at the end of the year has continued to decrease.

Table 2. Investigations commenced and final reports published.

Year	2015	2016	2017
Investigations commenced	24	25	18
Final reports published	35	24	25
Probable cause of accident established	35	23	25

The number of final reports published increased somewhat in 2017 compared with 2016, but is at a lower level than in 2015. Table 2 clearly shows the relationship between the number of final reports published in a particular year and the number of investigations commenced the previous year. The decrease in the number of final reports published compared with 2015 is due to the results achieved by the work to reduce investigation times and thereby the balance of ongoing investigations.

The probable cause of accident has been established in all cases, which is the same level as in 2015, but an increase compared with 2016, when the cause could not be established in one case.

Table 3. Number and proportion of investigations led by SHK concluded within 12 months and the mean and median investigation times in months.

	2015	2016	2017
Total number of reports published	35	24	25
Number of reports concluded within 12 months	28	16	19
Percentage concluded within 12 months	80	67	76
Mean investigation time	10.9	12.8	11.6
Median investigation time	11.4	11.8	11.5

The proportion of investigations that could be completed within twelve months was 76 per cent, which is higher than in 2016, when the corresponding figure was 67 per cent. However, this is a lower level than in 2015. Both the mean and the median investigation time for the investigations concluded over the course of the year have decreased, but are somewhat higher than in 2015. However, the investigation times clearly vary between different investigation areas, and this has an impact on the authority-wide results.

Of the investigations that took longer than twelve months, two are attributable to civil aviation, two to military occurrences, one to rail and one to other accidents or incidents. The more detailed reasons for why these could not be concluded within twelve months are reported below under each investigation area.

SHK's general assessment is that the goal to, if possible, conclude its investigations within twelve months has been fulfilled in civil maritime transport, rail, civil aviation, and other accidents or incidents. With regard to the investigations within these areas that exceeded twelve months, there are generally good grounds for arguing that it has not been possible to conclude them in less time.

For several years, investigations of military occurrences have stood out as the area in which it has been most difficult to achieve the objective of a maximum investigation time of twelve months. The two investigations concluded in 2017 took an average of 20 months to complete. SHK has taken measures to shorten the investigation times, and there is reason to expect that this will be noticeable in 2018.

Table 4. Number of ongoing SHK investigations at the end of the year, the percentage of these that had exceeded 12 and 18 months respectively at that time, and the mean and median investigation times in months.

	2015	2016	2017
Number of ongoing investigations at the end of the year	22	23	16
Percentage that had exceeded 12 months	18	9	0
Percentage that had exceeded 18 months	5	0	0
Mean investigation time at the end of the year	7.2	6.5	6.6
Median investigation time at the end of the year	5.8	6.8	6.2

The balance of ongoing investigations at the end of the year is significantly lower than in 2016 and 2015.

The percentage of ongoing investigations at the end of the year that were, at that time, older than 12 and 18 months, respectively, has continued to decrease sharply. At the end of 2017 there was no ongoing investigation that was older than twelve months.

Table 5. Safety recommendations.

Year	2015	2016	2017
Opening balance	38	30	63
Issued	65	88	53
Satisfactory responses	55	47	65
Unsatisfactory responses	18	8	5
Closing balance	30	63	46

The number of safety recommendations issued has decreased compared with both 2016 and 2015. The number of responses to recommendations that have been processed has increased and the closing balance has therefore decreased sharply compared with 2016. However, the balance is somewhat higher than in 2015, which is due to the very large number of safety recommendations issued in 2016, primarily in the civil maritime transport area.

Civil maritime transport

With regard to civil maritime transport, all investigations in which SHK has decided to delegate the task of leading the investigation to the investigative body of another state, in accordance with Section 8 d of the Accident Investigation Ordinance (1990:717) are reported separately (see Table 6). These decisions are motivated by the requirement in the same provision that each accident or incident at sea be subject to only one investigation conducted by an EU member

state. According to the Maritime Accident Investigation Directive, concerned member states are therefore to reach an agreement regarding which of them is to lead any such investigation.

There is almost no potential for SHK to influence the investigation times of these investigations, and these cases are concluded only once a final report is issued by the other country's accident investigation authority. Consequently, these investigation times are not reported. Any safety recommendations in such cases are followed up by the foreign investigation body and not by SHK, which is also why the recommendation handling process is not reported for these investigations.

Table 1. Total number of cases (including investigations led by another state).

Year	2015	2016	2017
Opening balance	19	16	7
New cases	217	209	224
Concluded cases	220	218	224
Closing balance	16	7	7

The number of occurrence reports received has increased compared with both 2016 and 2017. The closing balance is at the same level as in 2016 and has been more than halved compared with 2015.

Table 2. Preliminary assessments, investigations commenced and final reports published – investigations led by SHK

Year	2015	2016	2017
Preliminary assessments	6	6	7
Investigations commenced	8	6	4
Final reports published	10	10	6
Probable cause of accident established	10	10	6

The number of investigations commenced has decreased compared with 2016 and 2015. Seven preliminary assessments have been made by SHK over the course of the year, which is marginally more than in 2016 and 2015.

The number of reports published is also lower than in 2016 and 2015, which can be explained primarily by the work being done to reduce the backlogs of ongoing investigations, but also by the fact that fewer investigations have been initiated. Six final reports have been published over the course of the year. Probable causes of the accidents and incidents have been established in all cases, which was also the case in 2016 and 2015.

Table 3. Number and proportion of investigations concluded within 12 months and the mean and median investigation times in months – investigations led by SHK.

	2015	2016	2017
Total number of reports published	10	10	6
Number of reports concluded within 12 months	7	7	6
Percentage concluded within 12 months	70	70	100
Mean investigation time	12.6	14.4	11.0
Median investigation time	11.9	11.8	11.4

Of the final reports published over the course of the year, all were concluded within twelve months, which is an improvement on both 2016 and 2015, when 70 per cent were concluded in less than twelve months.

The mean investigation time for cases concluded in 2017, was 11 months which is also an improvement compared with 2016 and 2015. The median investigation time has also continued to decrease compared with both 2016 and 2015.

Table 4. Number of ongoing SHK investigations at the end of the year, the percentage of these that had then exceeded 12 and 18 months, respectively, and the mean and median investigation times in months.

	2015	2016	2017
Number of ongoing investigations at the end of the year	10	6	4
Percentage that had exceeded 12 months	20	0	0
Percentage that had exceeded 18 months	10	-	-
Mean investigation time at the end of the year	7.7	4.3	7.5
Median investigation time at the end of the year	6.1	4.2	8.2

The number of ongoing investigations at the end of the year has continued to decrease compared with 2016 and 2015. However, the mean and median investigation times for the investigations that were still ongoing at the end of the year are higher than in 2016. This is due to the fact that two of the ongoing investigations were already commenced in February and in March 2017, but had not yet been concluded at the turn of the year. This pushes up both the mean and median investigation times. However, at the turn of the year, there were no investigations that were older than 12 months.

Table 5. Safety recommendations – investigations led by SHK

Year	2015	2016	2017
Opening balance	23	6	29
Issued	26	51	7
Satisfactory responses	29	25 ³	29
Unsatisfactory responses	14 ⁴	3	3
Closing balance	6	29	4

In 2017, seven safety recommendations were issued and 32 responses have been assessed. With regard to the closing balance of four recommendations, either the deadline for a response has not yet passed or the response has not yet been conclusively assessed by SHK.

Of the responses to recommendations that have been assessed over the course of the year, 29 have been deemed satisfactory. The remaining three recommendation responses have been deemed not satisfactory. These are reported specifically below.

In the final report RS 2016:09, which concerned a workplace accident on board the vessel FINNPARTNER at the Port of Malmö on 24 November 2015, Copenhagen Malmö Port (CMP) was recommended to review the organisation and make the changes or clarifications that are needed to ensure that the management functions have good conditions to lead and manage all port operations in order to provide safe working conditions at the workplace (RS 2016:09 R1).

The background to this recommendation was the organisational weaknesses identified in the investigation. However, it was not possible to discern from CMP's response whether any such review of its organisation had been conducted. Even though the actions that CMP reported in connection to its response to the recommendation appeared to be adequate for making its operations safer, the recommendation response could not be deemed satisfactory.

SHK's final report RS 2016:10 concerned the cargo vessel KERTU that was owned by an Estonian shipping company and registered in Malta. The vessel ran aground in bad weather off Landsort and refloated itself after four hours. The vessel then anchored, but was taking in water at such a rate that it was close to foundering. The situation was made worse by the fact that the Swedish authorities did not intervene until more than ten hours had elapsed. It was then possible to evacuate the vessel, pump out the water and tow her into port. The vessel was subsequently scrapped.

³ Five of which were assessed to be partly satisfactory.

⁴ Ten of which were assessed unsatisfactory because no response at all to the recommendation was received by SHK.

In its final report, SHK issued, inter alia, two safety recommendations to the Ministry of Enterprise and Innovation. Both concerned the need to review Swedish legislation, which to some extent is based on EU legal instruments (RS 2016:10 R12 and R13). The Ministry of Enterprise and Innovation was recommended to evaluate applicable legislation concerning vessels' port of refuge, particularly as regards the authority to order a port to accept a vessel in distress and financial guarantees for ports in such situations. The Ministry of Enterprise and Innovation was also recommended to evaluate the legislation concerning Maritime Assistance Service (MAS), protected places and vessels in need of assistance.

The Ministry of Enterprise and Innovation has not responded to the safety recommendations despite it being obligated to do so under Section 17 of the Accident Investigation Ordinance (1990:717).

Table 6. Maritime investigations led by another state.

Year	2015	2016	2017
Opening balance	4	2	1
New cases	1	0	0
Concluded cases	3	1	1
Closing balance	2	1	0

Over the course of the year, no investigation led by another country's investigation body was initiated.

In maritime investigations that are led by another state's investigation body, subsequent to an agreement between the states concerned, SHK often has a limited involvement in the investigation. However, the amount of work required varies greatly and some of these investigations require a significant input on the part of SHK. This has a detrimental impact on the other investigations being conducted by SHK. Beyond SHK's own contributions to such investigations, SHK has very limited, if any, power to influence the investigation process and thereby also the investigation times.

Over the course of the year, one final report has been published for a foreign-led investigation in which SHK has participated.

Rail

Table 1. Total no. of cases.

Year	2015	2016	2017
Opening balance	4	1	5
New cases	47	50	26
Concluded cases	50	46	30
Closing balance	1	5	1

The number of occurrence reports received has decreased sharply in 2017 compared with 2016 and 2015. With regard to the closing balance, this has decreased compared with 2016 and is at the same level as in 2015.

Table 2. Investigations commenced and final reports published.

Year	2015	2016	2017
Investigations commenced	1	5	1
Final reports published	4	1	5
Probable cause of accident established	4	1	5

The number of investigations commenced has decreased compared with 2016 and is at the same level as in 2015. Over the course of the year, final reports were published in five cases, which is an increase compared with 2016 and 2015. The probable cause of accident was established in all cases, which was also true in 2016 and 2015.

Table 3. Number and proportion of investigations concluded within 12 months and the mean and median investigation times in months.

	2015	2016	2017
Total number of reports published	4	1	5
Number of reports concluded within 12 months	4	1	4
Percentage concluded within 12 months	100	100	80
Mean investigation time	11.7	8.9	11.4
Median investigation time	11.8	8.9	11.5

Of the investigations concluded over the course of the year, all but one could be concluded within twelve months. This is a deterioration compared with 2016 and 2015 when all concluded investigations were conducted in less than twelve months. The mean and median investigation times have deteriorated compared with 2016 but have improved somewhat compared with 2015. The explanation for the increased investigation times is mainly to be found in the fact that two of the three rail investigators at SHK left their positions in the first half of 2017.

The investigation for which the investigation time exceeded twelve months is commented on specifically below.

Final report RJ 2017:05 concerns a collision between two freight trains at Fångsjöbacken station in Jämtland county. The investigation time was 14 months. The reason why the investigation took so long was that there were several ongoing rail investigations at the same time and that this coincided with the reduction of rail investigators at

SHK from three to one. The accident in Fångsjöbacken was the incident that occurred last of the incidents in question, which is why this investigation initially had to take a back seat in favour of the investigations of previously occurring incidents.

Table 4. Number of ongoing investigations at the end of the year, the percentage of these that had then exceeded 12 and 18 months, respectively, and the mean and median investigation times in months.

	2015	2016	2017
Number of ongoing investigations at the end of the year	1	5	1
Percentage that had exceeded 12 months	0	0	0
Percentage that had exceeded 18 months	-	-	-
Mean investigation time at the end of the year	3.9	4.6	2.6
Median investigation time at the end of the year	3.9	3.3	2.6

The number of ongoing investigations at the end of the year was lower than in 2016 and at the same level as in 2015. The investigation time for the only ongoing investigation was just over two months at the turn of the year.

Table 5. Safety recommendations.

Year	2015	2016	2017
Opening balance	6	0	1
Issued	4	1	6
Satisfactory responses	9 ⁵	0	1
Unsatisfactory responses	1	0	0
Closing balance	0	1	6

Over the course of the year, six safety recommendations have been issued. One recommendation response has been assessed and was deemed satisfactory. With regard to the closing balance of six recommendations, either the deadline for a response has not yet passed or the response has not yet been conclusively assessed by SHK.

Civil aviation

For the area of civil aviation, investigations that are conducted in accordance with Annex 13 to the Chicago Convention by accident investigation authorities in other countries – but in which SHK shall or may appoint an accredited representative – are reported separately

⁵ Of which one response was deemed satisfactory.

(see Table 7). There is almost no potential for SHK to influence the investigation times of these investigations and these cases are concluded only once a final report is issued by the other country's accident investigation authority. Consequently, these investigation times are not reported. The safety recommendations issued by the foreign investigation body are followed up by that authority and not by SHK, which is why statistics concerning the processing of recommendations are also not reported for these cases.

Table 1. Total number of cases (including investigations led by another state).

Year	2015	2016	2017
Opening balance	31	24	23
New cases	126	123	140
Concluded cases	133	124	141
Closing balance	24	23	22

The number of occurrence reports received has increased in relation to both 2016 and 2015. Previously, these have decreased sharply for a number of years, but it is too early to say whether the increase in 2017 is a temporary change or a break in trend. However, the total balance of civil aviation cases has also continued to decline somewhat compared with the previous year.

Table 2. Investigations commenced by SHK, by aviation category and type of aircraft.

Category	2015	2016	2017
Commercial aviation	1	7	1
Private aviation	11	6	8
Civil state aviation	-	-	-
Total	12	13	9
<i>Of which type of aircraft</i>			
Large aircraft ⁶	-	6	-
Multi engine light aircraft	2	1	-
Single engine light aircraft	5	-	5
Seaplane	-	-	-
Helicopters	1	3	1
Gliders	4	2	3
Hot air balloons	-	1	-
Other	-	-	-

The number of investigations commenced has decreased compared with both 2016 and 2015.

⁶ Large aircraft are aircraft with a maximum take-off mass of more than 5,700 kg.

Table 3. Final reports issued by SHK, by aviation category and type of aircraft.

Category	2015	2016	2017
Commercial aviation	3	3	6
Private aviation	13	8	5
Civil state aviation	1	-	-
Total	17	11	11
<i>Of which type of aircraft</i>			
Large aircraft	2	4	5
Multi engine light aircraft	-	-	1
Single engine light aircraft	3	3	-
Seaplane	1	-	-
Helicopters	4	2	1
Gliders	7	2	3
Hot air balloons	-	-	1
Other	-	-	-
Probable cause of accident established	17	10	11

Over the course of the year, 11 final reports have been published, which is the same level as in 2016, but a reduction compared with 2015. It has been possible to establish probable causes of the accidents and incidents in all cases, which is a marginal increase compared with 2016, but at the same level as in 2015.

Table 4. Number and proportion of investigations concluded within 12 months and the mean and median investigation times in months – investigations led by SHK.

	2015	2016	2017
Total number of reports published	17	11	11
Number of reports concluded within 12 months	16	8	9
Percentage concluded within 12 months	94	73	82
Mean investigation time	8.4	10.9	10.3
Median investigation time	9.4	11.2	11.5

Of the final reports published over the course of the year, 82 per cent were completed in less than twelve months. This is an improvement compared with 2016, but a little poorer than in 2015.

The mean investigation time for the investigations concluded in 2017 has decreased in relation to 2016, but is higher than in 2015. The

median investigation time has increased compared with 2016 and 2015.

The two investigations for which the investigation time exceeded twelve months are commented on specifically below.

Final report RL 2017:04 concerns an accident at Ängsö, Västmanland county on 22 January 2016 involving an aircraft of the model Diamond DA 42, operated by a flying school. The investigation time was just under 14 months. The main reason why the investigation took so long was the need for relatively extensive contacts with the type certificate holder in Austria, the engine manufacturer in Germany and the European Aviation Safety Agency, EASA.

Final report RL 2017:10 concerns a serious incident at Gothenburg/Landvetter Airport on 7 November 2016 involving an aircraft of the model AVRO 146-RJ 100, operated by Braathens Regional Aviation AB. The investigation time was 13 months. The main reason why the investigation took somewhat longer was partly that the investigation was relatively complex and concerned areas, aeroelasticity and de-icing, which required the engagement of external expertise. Another explanation is that the external consultation process came to require longer time than planned as a result of relatively extensive points of view received, and a request for a meeting from the United Kingdom's accredited representative and the aircraft's British type certificate holder.

Table 5. Number of ongoing SHK investigations at the end of the year, the percentage of these that had then exceeded 12 and 18 months, respectively, and the mean and median investigation times in months.

	2015	2016	2017
Number of ongoing investigations at the end of the year	7	9	7
Percentage that had exceeded 12 months	14	0	0
Percentage that had exceeded 18 months	0	-	-
Mean investigation time at the end of the year	7.4	7.0	5.6
Median investigation time at the end of the year	6.2	7.7	6.0

Of the investigations that were still ongoing at the end of the year, there were none that had an investigation time that, at that time, was in excess of twelve months, which is at the same level as in 2016 and a clear improvement compared with 2015. Both the mean and median investigation times for these investigations were at the turn of the year lower than at the corresponding time in both 2015 and 2016.

Table 6. Safety recommendations.

Year	2015	2016	2017
Opening balance	9	4	23
Issued	9	23	15
Satisfactory responses	12 ⁷	2 ⁸	23⁹
Unsatisfactory responses	2	2	1
Closing balance	4	23	16

In 2017, 15 safety recommendations were issued and 24 responses have been assessed. With regard to the closing balance of sixteen recommendations, either the deadline for a response has not yet passed or the response has not yet been conclusively assessed by SHK.

Of the responses to recommendations that have been assessed over the course of the year, twenty have been deemed satisfactory and three have been deemed only partly satisfactory. One recommendation response has been deemed not satisfactory. The recommendation responses that have been deemed either only partly satisfactory or not satisfactory are commented below.

In the final report RL 2016:05, which concerned an accident during a training flight, the European Aviation Safety Agency, EASA, was recommended, inter alia, to identify exercises in flight training that might entail an increased risk factor and to issue guidance material (GM) for the practical execution of such exercises (RL 2016:05 R1).

The background was that Commission Regulation (EU) No 1178/2011 laying down technical requirements and administrative procedures related to civil aviation aircrew lays down requirements for minimum levels in terms of what has to be practised in different categories of flight training. However, EASA has not produced any guidance material for flying schools concerning how these exercises are to be carried out in practice or what limitations should be applied when practising certain elements of the curriculum.

In its response to the recommendation, EASA stated that it did not intend to issue any guidance material. EASA instead intended to support the competent authorities of the Member States in their oversight responsibilities and maintained that the management of risks is to take place as part of the flying schools' own safety management systems (SMS). SHK deemed the recommendation response to be only partly satisfactory.

In the final report RL 2017:03, which concerned a serious incident in connection with landing at Gällivare Airport, the International Civil

⁷ One of which has been deemed only partly satisfactory.

⁸ One of which has been deemed only partly satisfactory.

⁹ Three of which have been deemed only partly satisfactory.

Aviation Organisation, ICAO, was recommended to work towards the introduction of a generic Safe Landing Concept including the flight phase from the runway threshold until full stop (RL 2017:03 R1).

The background was that there are no recommendations for the final part of an approach, from the threshold to positive touchdown and full stop.

In its response to the recommendation, ICAO stated that the intent of the safety recommendation has already been taken care of in existing ICAO provisions. SHK noted, however, that the reference made by ICAO only concerned guidance for performance considerations before landing, and therefore deemed the recommendation response to be not satisfactory.

In the final report RL 2017:06, which concerned an accident involving a hot air balloon at Nynäs Fallet in Örebro county, EASA was recommended to consider introducing time margins between planned landing time and significant weather conditions (RL 2017:06 R1).

In its recommendation response, EASA referred to new rules that are being worked out and that will contain a requirement on operators to themselves identify and evaluate safety risks in their operations, to take action to deal with these risks and to verify that such action is effective. The proposal also contains a requirement on the operators to establish procedures and draw up instructions regarding the crew members' duties and responsibilities. According to EASA, this should also include details relating to the gathering and assessment of weather forecasts and the planning of the time and site for landing with appropriate margins. According to EASA, more detailed rules would conflict with the objective to supply a simpler and more proportional regulatory framework for balloon air operations.

In its assessment of the recommendation response, SHK noted that the new system will surely function when it comes to larger operators. However, balloon air operations are often run by small operators that have limited resources for drawing up advanced safety management systems. According to SHK, these operators would be better served by being given clear, simple rules to relate to. In the light of this, SHK is of the opinion that EASA's response can only be considered partly satisfactory.

EASA was also recommended to consider introducing requirements for safety harness or other restraint systems for all types of balloons in commercial passenger operations and clarifying the conditions in which the system is to be used (RL 2017:06 R2).

Also regarding this recommendation, EASA referred to the aim of the forthcoming regulatory framework as being to achieve a simpler and more proportional set of rules for balloon air operations that is based on the principle that the operators themselves are to identify, assess

and deal with risks in their operations. EASA also states that a restraint system in a balloon without a separate compartment for the pilot-in-command would entail a risk of someone tripping or getting caught in the system or of restricting the pilot-in-command's freedom of movement.

SHK noted that rules concerning restraint systems already exist for other types of balloons and that the occurrence demonstrates that there is a risk of the pilot-in-command falling out of the basket if no such system exists, also in this type of balloon. According to SHK, this risk is greater and more serious than that of someone getting tangled up in the restraint system. SHK also stated that balloon air operators are often small organisations that have limited resources for drawing up advanced safety management systems. Therefore, according to SHK, clear, simple rules concerning some form of restraint system would be a more effective means of improving safety. In light of this, SHK assessed that this recommendation response could also be considered only partly satisfactory.

Table 7. Foreign aviation investigations in which SHK has participated.

Year	2015	2016	2017
Opening balance	19	17	13
New cases	8	6	13
Concluded cases	10	10	12
Closing balance	17	13	14

Over the course of the year, SHK has participated in thirteen new foreign investigations through an accredited representative or an expert in accordance with Annex 13 to the Chicago Convention. In 2016, SHK was involved in six new foreign investigations and the corresponding figure for 2015 was eight. It has been possible to conclude twelve such cases in 2017. The closing balance has increased somewhat compared with 2016, but is at a lower level than in 2015.

To a varying degree, also these investigations result in an input of labour on the part of SHK. Consequently, they also have a detrimental impact on SHK's own investigations in terms of investigation times and the total number of investigations completed.

Military occurrences

Table 1. Total number of cases (including investigations led by another state).

Year	2015	2016	2017
Opening balance	3	5	4
New cases	17	21	23
Concluded cases	15	22	22
Closing balance	5	4	5

The number of occurrence reports received has increased somewhat compared with 2016 and 2015. The closing balance at the end of the year has increased somewhat compared with 2016, but is at the same level as in 2015.

Table 2. Investigations commenced and final reports published – investigations led by SHK.

Year	2015	2016	2017
Investigations commenced	2	1	3
Final reports published	2	2	2
Probable cause of accident established	2	2	2

Three new investigations have been commenced over the course of the year, which is an increase in relation to 2016 and 2015, when one and two, respectively, investigations were commenced. Two final reports have been published, which is the same as the previous year. As in 2016 and 2015, it was possible to establish the causes of the occurrences in both investigations.

Table 3. Number and proportion of SHK investigations concluded within 12 months and the mean and median investigation times in months.

	2015	2016	2017
Total number of reports published	2	2	2
Number of reports concluded within 12 months	0	0	0
Percentage concluded within 12 months	-	-	-
Mean investigation time	18.4	17.5	19.9
Median investigation time	18.4	17.5	19.9

Neither of the investigations concluded were completed within twelve months, which was also the case in 2016 and 2015. The mean investigation time was just under 20 months. Commentary on these investigations will be provided in the following section.

Final report RM 2017:01 concerns a serious incident at Visingsö involving a helicopter 16 operated by the Swedish Armed Forces. The investigation time was just over 20 months. While the investigation was extensive and highlighted several problem areas within the Swedish Armed Forces' helicopter operations, this still does not explain the long investigation time. However, it may be added that the Swedish Armed Forces was, during the course of the investigation, continuously informed of observations made.

Final report RM 2017:02 deals with a serious incident south of Namsos in Norway on 27 February 2016 involving a helicopter 14D

operated by the Swedish Armed Forces. The investigation time was 19 months. The long investigation time can be partly explained by the fact that a new investigator had to be appointed at a late stage of the investigation as the previous investigator had fallen ill. Although the investigation was relatively complex this cannot, however, fully explain the long investigation time.

Table 4. Number of ongoing SHK investigations at the end of the year, the percentage of these that had then exceeded 12 and 18 months, respectively, and the mean and median investigation times in months.

	2015	2016	2017
Number of ongoing investigations at the end of the year	3	2	3
Percentage that had exceeded 12 months	33	50	0
Percentage that had exceeded 18 months	0	0	-
Mean investigation time at the end of the year	8.5	12.4	8.3
Median investigation time at the end of the year	7.9	12.4	7.2

At the end of the year, the mean and median investigation times for cases that were ongoing at that time were lower than was the case in both 2016 and 2015.

Table 5. Safety recommendations.

Year	2015	2016	2017
Opening balance	0	16	6
Issued	16	13	20
Satisfactory responses	0	20	6
Unsatisfactory responses	0	3	0
Closing balance	16	6	20

Over the course of the year, twenty safety recommendations were issued and six responses have been assessed. With regard to the closing balance of twenty recommendations, the responses were received in late October and December and have not yet been conclusively assessed by SHK. All assessed recommendation responses have been deemed satisfactory.

Other accidents or incidents

Table 1. Total number of cases (including investigations led by another state).

Year	2015	2016	2017
Opening balance	2	2	2
New cases	8	10	5
Concluded cases	8	10	6
Closing balance	2	2	1

The number of occurrence reports received and the closing balance have decreased compared with both 2016 and 2015.

Table 2. Investigations commenced and final reports published – investigations led by SHK.

Year	2015	2016	2017
Investigations commenced	1	0	1
Final reports published	2	0	1
Probable cause of accident established	2	-	1

One new investigation has been commenced over the course of the year. This concerns a bus accident south of Sveg in Härjedalen municipality, Jämtland county.

One final report has been completed over the course of the year. It has been possible to establish the probable cause of accident, which was also the case with the two reports that were completed in 2015.

Table 3. Number and proportion of SHK investigations concluded within 12 months and the mean and median investigation times in months.

	2015	2016	2017
Total number of reports published	2	0	1
Number of reports concluded within 12 months	1	-	0
Percentage concluded within 12 months	50	-	-
Mean investigation time	14.5	-	14.0
Median investigation time	14.5	-	14.0

The investigation time for the investigation concluded in 2017 was fourteen months and is commented on below.

SHK's final report RO 2017:01 concerns a wind turbine that collapsed and fell to the ground. The tower was constructed in sections that were held together with bolted joints. The investigation showed that the installation had not achieved sufficient pre-tension force in the bolted

joints, which subsequently led to fatigue failure in the bolts. The manufacturer had noted the deficiencies, which not only concerned the wind turbine in question, but had not itself managed to identify their causes. The manufacturer's head office was in Denmark, the screws were manufactured in Germany and parts of the tower's structure were manufactured in China.

That the investigation could not be conducted within twelve months was due to it being complex and SHK also needed to make use of external expertise in addition to its own resources. Furthermore, there was a need to take investigative measures in Sweden, Denmark and Germany.

Table 4. Number of ongoing SHK investigations at the end of the year, the percentage of these that had then exceeded 12 and 18 months, respectively, and the mean and median investigation times in months.

	2015	2016	2017
Number of ongoing investigations at the end of the year	1	1	1
Percentage that had exceeded 12 months	0	1	0
Percentage that had exceeded 18 months	-	0	-
Mean investigation time at the end of the year	0.2	12.3	8.9
Median investigation time at the end of the year	0.2	12.3	8.9

The investigation that was still ongoing at the end of the year concerns the aforementioned bus accident. The investigation time was just under nine months at that time and the final report will probably be published at the beginning of 2017.

Table 5. Safety recommendations.

Year	2015	2016	2017
Opening balance	0	4	4
Issued	10	0	5
Satisfactory responses	5	0	8
Unsatisfactory responses	1	0	1
Closing balance	4	4	0

In 2017, five safety recommendations were issued and nine responses have been assessed. There were no remaining recommendations to be assessed at the end of the year.

Of the responses to recommendations that have been assessed over the course of the year, eight have been deemed satisfactory. One has been deemed not satisfactory and is commented on below.

SHK's final report RO 2017:01 concerned a wind turbine that collapsed and fell to the ground. The report has been commented on above. In the final report, a safety recommendation was issued inter alia to the Swedish Work Environment Authority to strengthen the inspections regarding the fulfilment of the EU "Machine Directive" to ensure that machines are compliant with the requirements for safety during the full life span of the machine (RO 2017:01 R5).

In its response, the Swedish Work Environment Authority outlined the supervisory possibilities it has. SHK noted that the Swedish Work Environment Authority's response did not indicate any increase of ambition and that it could not be understood from the response if the supervisory activities that were planned related to the wind turbine in question, to the wind farm in question, to all wind turbines from the manufacturer in question or to wind turbines in Sweden in general. In light of this, SHK deemed the recommendation response to be only partly satisfactory.

2.3.3 *Other safety-related activities and collaboration with other bodies*

Pursuant to Section 1 of the Ordinance (2007:860) with instructions for SHK, the authority is to cooperate with the relevant safety authorities in their efforts to prevent accidents. SHK is also to collaborate with authorities and organisations in other countries in matters within SHK's scope of responsibility. It is the authority's assessment that both national and international collaboration generally functions well and is being developed continuously.

In accordance with Section 6, second paragraph of the Accident Investigation Ordinance (1990:717), the Swedish Transport Agency, the Swedish Armed Forces and the Swedish Civil Contingencies Agency (MSB) have the right to insight into SHK's investigations. This allows these authorities, when necessary, to take regulatory or supervisory action without delay. These authorities, although without being a part of the investigation team, follow SHK's investigations by appointing an advisor or coordinator in each investigation, who can then keep the respective authority informed of the progress of the investigation.

SHK also has regular meetings with these and other relevant authorities in order to discuss procedures for cooperation, as well as specific safety recommendations that are issued as part of investigations. Legislative changes are also discussed in these meetings, as are other topical matters that are of interest from a safety perspective.

Thus, in addition to consultations that takes place continually within the scope of the individual accident investigations, SHK has had two meetings at the operational level in 2017 with the Swedish Transport Agency's Road and Rail Department and one meeting each with the "maritime section" and "civil aviation section" of the Agency's Civil

Aviation and Maritime Department. Collaboration meetings have also been conducted with the Swedish Armed Forces and MSB. Collaboration meetings at the Directors' level have taken place with the Swedish Transport Agency, the Swedish Maritime Administration and the Swedish Coast Guard.

A large proportion of the international collaboration in which SHK is involved can be regarded as mandatory as a consequence of international legal instruments. This is especially true for the EU, where such collaboration is formally regulated in Regulation (EU) No. 996/2010 of the European Parliament and of the Council on the investigation and prevention of accidents and incidents in civil aviation, in Directive 2009/18/EC of the European Parliament and of the Council establishing the fundamental principles governing the investigation of accidents in the maritime transport sector (the Maritime Accident Investigation Directive) and in Directive (EU) 2016/798 of the European Parliament and of the Council on railway safety (the Railway Safety Directive).

Furthermore, many of SHK's accident investigations are of an international nature. This is especially applicable to aviation and maritime occurrences. It is therefore important for SHK to create and maintain good contacts and increase the sense of mutual understanding between accident investigation authorities in different countries, even outside of the "mandatory" forums that are regulated by EU legislation. At the Directors' level, SHK collaborates annually both with other Nordic accident investigation authorities and within ITSA (the International Transport Safety Association), which includes fifteen other foreign authorities, including several of the largest and, for SHK, most important partners in terms of international investigations, for example the United States, Canada, France, the United Kingdom and Australia. SHK also participates regularly at the investigator level in an international knowledge and skills sharing, mainly within the various types of transport.

2.3.4 *Human resources*

In accordance with Chapter 3, Section 3 of the Ordinance concerning Annual Reports and Budget Planning Documents (2000:605), SHK shall document measures implemented in order to ensure that skilled staff are available to accomplish the duties that are laid down in the authority's instructions and, where appropriate, in the Government's appropriation directions or in any other decision. This includes an assessment of how the measures implemented have contributed overall to the accomplishment of these duties.

General

Section 4 of the SHK Instructions Ordinance states what certain types of expertise are to be represented among the authority's accident investigators. At least one investigator aside from the Director General

must be a lawyer with professional experience as a judge. There must also be accident investigators who have operational and technical expertise from the aviation, maritime and rail sectors, general technical expertise, expertise in the field of civil protection and rescue services, as well as expertise in behavioural sciences.

At the end of 2017, SHK had 29 employees: 8 female and 21 male. The average age of SHK's employees was 51. Over the course of the year, four members of staff were hired and eight members of staff left their respective positions.

Apart from this, in accordance with its instructions, SHK engages experts and specialists in various areas as consultants in order to assist the authority in its investigations.

Attracting and recruiting

Those applying for work at SHK should feel that the recruitment process is professional, efficient and transparent. Information about available positions is published primarily on SHK's website, at the national work exchange (Arbetsförmedlingen), in daily newspapers and in various trade and industry specific magazines. Recruitments at SHK are managed in accordance with the coherent process *Recruitment* within the scope of the operations management system.

When recruiting investigators, applicants are required to have many years of experience in the relevant area of expertise and a good ability to express themselves verbally and in writing. The applicants' theoretical and practical skills are assessed using tests. A major emphasis is placed on applicants' personal qualities.

As mentioned previously, SHK has employed four persons in 2017, each replacing an employee who left the authority.

One investigator in the area of civil protection and rescue services left their post in spring 2016. SHK has decided to defer a possible replacement in this area until it is clear what the results will be of the legislative review (SOU 2014:82) concerning the investigation of rescue services operations in the Accident Investigation Act (1990:712). In its dialogue with the Ministry of Justice, SHK has received information that the matter has been given lower priority and that there is currently no active work to proceed with these proposals. In light of this, SHK decided to reassume the recruiting of an investigator in the area of rescue services in 2017. The position is expected to be appointed in the first quarter of 2018.

The experience from past recruitments is that SHK is perceived as an attractive place to work at and that it is not difficult to recruit qualified staff. However, it is difficult to find qualified female applicants to investigator positions. SHK is actively working to increase the number of female investigators, but must at the same time note that the

difficulties in achieving this goal are due to circumstances outside the authority's control.

SHK has contracted out work to consultants in several fields. The procurement processes are conducted in accordance with the coherent support process *Procurement* within the scope of the operations management system. In order to obtain a consultancy contract, there is a requirement for a high level of expertise in the field in question and experts are required to monitor developments in their field and take responsibility for any necessary professional development.

Developing

SHK's remit places great demands on the experience and skills of its staff. The compulsory requirements for candidates consist of theoretical knowledge and practical experience in their individual investigation area. Following employment, professional development is conducted in accordance with the coherent process *Professional Development* within the scope of the operations management system.

All newly employed investigators begin with an introductory training programme that includes training in advanced accident investigation, knowledge of public administration including the role of civil servants and the common basic values of government, safety at accident sites and other work environment issues, in addition to internal procedures and rules. Accident investigator skills are updated, maintained and developed continuously by means of on the job training, as well as continuation courses and refresher courses.

Detailed recommendations are issued by the International Civil Aviation Organisation (ICAO) with respect to the training of civil aviation investigators. An air accident investigator must have considerable experience from the field of aviation as a base for further training to become an accident investigator. Individual development plans corresponding to ICAO's *Training Guidelines* are available for all air accident investigators. These are followed up continuously and supplemented when necessary with new training programmes in order to update investigators' knowledge so that this keeps pace with developments in the field. Training in advanced accident investigation with a focus on civil aviation takes place abroad as this is not available in Sweden.

There are also relatively clear demands placed on investigator expertise and professional background within the field of maritime investigation. The International Maritime Organisation's (IMO) code for Safety Investigation into a Marine Casualty or Marine Incident (Casualty Investigation Code) and EU Directive 2009/18/EC establishing the fundamental principles governing the investigation of accidents in the maritime transport sector both refer to the part of *IMO Res. A.996 (25)* which concerns expertise criteria for marine accident investigators. To fulfil these requirements, there are individual

development plans for SHK's maritime investigators that are supplemented when necessary.

The rail transport area has no similar qualification at the international level, but SHK still has corresponding development plans for its rail investigators.

At least two performance reviews are conducted per year with all employees. At least one of these follows up existing professional development plans, and a plan for future professional development is established.

Retaining

Staff turnover was 25.8 per cent in 2017, an increase of 17.3 percentage points in comparison with the previous year when staff turnover was 8.5 per cent. In 2015, the staff turnover was 11.6 per cent.

In 2017, eight members of staff left their positions. Of these, one person had a two-year temporary position that expired during the year. Three persons, having been on leave of absence for an extended period, chose to leave their positions. Two persons retired and two persons chose to leave their positions for other reasons.

SHK offers interesting and stimulating duties of an advanced nature with good opportunities for professional development. The authority applies an individual pay structure for each employee, offers competitive salaries, flexible or non-regulated working hours and works actively with work environment and equal treatment and discrimination issues. The authority also offers its employees health examinations, one hour of health promotional activities time per week and a yearly allowance to cover costs for such activities.

Monthly information meetings are held for the entire staff so that all employees have an opportunity to follow along with what is happening at SHK. Departmental meetings, which are also an important source of information, are held regularly. In addition to this, all employees are involved in the authority's operational planning through activities including a two-day out of office conference which is held every autumn.

As of the autumn 2016, SHK has a well-developed intranet, where information is published on an ongoing basis and where the authority's operations management system is available for easy use in day-to-day work.

Phasing out

So far, SHK has not had any need to work actively with restructuring or phasing out at the organisational level.

In 2017, two investigators retired, one in the area of civil aviation and one in the area of rail transport. Work to recruit replacements for both of these has been carried out.

One investigator in the area of civil maritime transport left during the year, and work to recruit a replacement has been carried out.

Furthermore, one investigator in the area of rail transport left during the year. SHK has made the assessment that two rail transport investigators cover SHK's present needs in the area and has decided to defer a possible replacement.

Two members of administrative staff left their positions in 2017, and work to recruit replacements for both these positions has been carried out.

One member of staff, a head of department, left their position during the year. Work to recruit a replacement was already carried out in 2014 when that head of department applied for and was granted a leave of absence.

Skills transfer

SHK's operations management system creates clarity in terms of how SHK's operations function and facilitate the transfer of knowledge.

Collaboration across investigation areas and departmental boundaries in terms of the use of staff resources has continued to be developed in 2017. In order to ensure that there is a transfer of skills, duties are redistributed between existing members of staff and opportunities are created for on the job learning, e.g. by ensuring that less experienced investigators work together with those who are more experienced. New members of staff undergo an extensive introduction programme with the support of an internally appointed mentor.

The training period for a new investigator is long, and in order to ensure transfer of skills, SHK tries to recruit replacements in good time prior to retirement, which leads to increased staffing costs.

Overall assessment

SHK complies with the skills requirements laid down in its Instructions Ordinance. SHK considers that measures taken in terms of the supply of skills have contributed to the fulfilment of the authority's duties in accordance with the Instructions.

As mentioned above, the training period for a new investigator is long. It is almost impossible to find people who both fulfil the high demands in terms of experience and theoretical knowledge in their respective field of investigation and have prior experience of advanced accident investigation. This means that the authority is very vulnerable, and it is also costly if a replacement is to work in parallel

with the individual who is to leave so as to ensure that the skills are transferred.

SHK's experience is that an increasing number of people are choosing to continue their employment even after they turn 65. This means that retirements cannot be predicted in the same way as before. A further challenge in this context is that those aged between 65 and 67 have a notice period of only one month, which is far too short a time to ensure that their skills are transferred if replacements are recruited.

Longer leaves of absence, e.g. for studies, parental leave, sick leave or in order to gain experience in other areas, also lead to a considerable setback in the investigative work. It is often the case that by the time a temporary replacement has been trained to a level sufficient in order for them to begin to take independent responsibility for an investigation, their temporary contract is almost at an end.

Overall, this leads to hiccups in planning and has a particularly detrimental impact on the ambition to maintain short investigation times.

Trainee positions at government agencies and Modern temporary jobs in the public sector

Over the course of the year, SHK has particularly worked with the two government assignments regarding *Trainee positions at government agencies and Modern temporary jobs in the public sector*. Since all positions at SHK are security-classified, Swedish citizenship is a prerequisite for a newly arrived immigrant or a person with a disability to participate in either of these assignments.

SHK is keen to provide persons in these programmes with meaningful experiences and duties that enhance their opportunities for future work. However, SHK, which is a relatively small authority with limited resources, has assessed that it is not possible at the same time to receive both a trainee and an employee as part of the assignment *Modern temporary jobs in the public sector*. This assessment is based on the fact that the kind of work tasks possible to offer within these programmes are few in number and so similar that there would be competition for them, and thus the time spent at the workplace would not be meaningful.

In 2017, SHK has received one person with a disability as part of the *Trainee positions at government agencies* programme. The traineeship was conducted for six months on a half-time basis.

In 2017, SHK has made preparations to employ one person in the course of 2018 as part of the *Modern temporary jobs in the public sector* programme.

2.3.5 *Efficiency and sound economic management*

Section 2.3.2 presented key performance indicators (KPIs) as grounds for an assessment of the extent to which the authority has succeeded in its ambition to streamline investigative operations in order to achieve the goal of investigation times that, if possible, do not exceed twelve months. Three additional KPIs a basis for the assessment of whether or not operations have been run efficiently and in a sound economic way are presented below:

1. Total working hours distributed among SHK's processes.
2. The number and proportion of full-time equivalents (FTEs) in SHK's support functions in relation to the total number of FTEs.
3. Costs for administrative support in relation to total operational costs.

KPI 1 – Total working hours distributed among SHK's processes

Below is a summary of how the total working hours for all employees, and respectively for investigators only, are distributed among SHK's processes.

Table 1. Distribution of total working hours among SHK's processes.

Process	Proportion in % of total working hours 2015		Proportion in % of total working hours 2016		Proportion in % of total working hours 2017	
	All employees	Investigators	All employees	Investigators	All employees	Investigators
Accident and incident investigation	48	61	54	69	53	69
External cooperation	7	9	8	10	7	8
Professional development	5	7	5	7	4	6
Total percentage of core duties	60	77	67	86	64	83
Management and governance	17	12	15	7	17	8
Support	23	11	18	7	19	9

SHK's operational plan for 2017 states the overall goal that the balance between the time that investigators spend on core duties (approximately 80 per cent) and the time spent on other work (approximately 20 per cent) should not shift to the detriment of core activities. SHK's core duties include investigations, national and international cooperation with other authorities, etc. on safety matters, and professional development. In 2017, 64 per cent of the total working hours have been spent on SHK's core duties. This is a decrease of three percentage points in comparison with the previous year, when the proportion was 67 per cent. For SHK's accident investigators the proportion of their total time, which is spent on core tasks was 83 per cent, a decrease of three percentage points in

comparison with 2016, when the proportion was 86 per cent. The goal in SHK's operational plan for 2017 was nevertheless fulfilled. The corresponding figures for 2015 were 60 and 77 per cent, respectively.

The time spent by investigators on the most important core duty, that of investigating accidents and incidents, is at the same level as the previous year. However, the time spent on the core duties of external cooperation and professional development has decreased by 2 and 1 percentage points, respectively.

The fact that the total amount of time spent on core duties has decreased in favour of support duties can be explained to some extent by four investigators having been recruited in 2017, which took up some of the existing investigators' time that year. Only one investigator was recruited in 2016. The decrease is also explained by the fact that part of the group of investigators has spent more time on trade union work in 2017 than in 2016.

The time spent by investigators on management and governance has increased by one percentage point in comparison with 2016. This is largely explained by SHK's three chairs of accident investigations having spent more time on governance and development in 2016.

KPI 2 – The number and proportion of full-time equivalent employees (FTEs) in support functions in relation to the total number of FTEs

As a measure of efficiency and sound economic management, the number of FTEs in support functions is reported in relation to SHK's total number of FTEs. A decrease in the proportion of administrative staff in relation to the number of staff working in core activities may be an indication that the authority's activities are being run more efficiently. However, too small a proportion may mean that staff working in core activities need to spend more of their working hours on administration at the risk of decreased productivity. Based on the authority's current remit and organisational division, SHK assesses that in order to achieve efficiency and a good balance between support functions and core activities, the proportion of support staff should not exceed 30 per cent of the total number of FTEs.

Table 2. Number and proportion of support staff FTEs in relation to SHK's total number of FTEs.

Year	Total FTEs	Number of FTEs in support functions	FTEs in SHK's support functions, as a proportion of the total number of FTEs
2015	30.29	7.73 ¹⁰	26 %
2016	30.46	7.78 ¹¹	26 %
2017	27.89	7.02¹²	25 %

¹⁰ Including one externally contracted agency caretaker in 2015.

¹¹ Including the proportion of one FTE that consists of an externally contracted agency caretaker in 2016 (SHK's in-house caretaker was on a leave of absence for five months).

¹² Including the proportion of one FTE that consists of an externally contracted agency caretaker in 2017 (SHK's in-house caretaker was on a leave of absence for three months).

The proportion of SHK’s total number of FTEs made up of support staff was 25 per cent in 2017, which is a decrease of one percentage point in comparison with the previous year. The decrease is largely explained by a temporary position at the registry having ended in mid-2017.

SHK, which is a relatively small authority, procures certain administrative services externally in order to be cost effective. These services include financial and human resources administration, IT operations and support, as well as support in larger procurement processes. These services are not included in the statistics above.

KPI 3 – Cost of administrative support in relation to total operational costs

The cost of SHK’s administrative support in relation to SHK’s total operational costs and how these have changed over time is reported below as another measure of efficiency and sound economic management.

Reasoning similar to the above can also be applied here. A reduction in the cost of administrative support in relation to the total operational costs can be an indication that the authority’s operations have been run more efficiently, but reduced resources in the support functions may also mean that staff involved in core activities have to allocate more of their working hours to administrative duties at the risk of reduced productivity in the core activities. SHK assesses that in order to achieve efficiency and a good balance between support functions and core activities, the cost of administrative support should not exceed 20 per cent of SHK’s total operational costs.

Table 3. Cost of administrative support in relation to total operational costs.

Year	Cost of administrative support in relation to total operational costs
2015	16.1 %
2016	17.1 %
2017	17.9 %

The cost of administrative support includes salaries for permanent staff and bought-in services within the support functions management, finance, registry, IT, communications, procurement and internal services.

SHK’s administrative support cost has increased in relation to total operational costs by 0.8 per cent in comparison with the previous year. This increase is primarily explained by SHK’s total operational costs for 2017 being 4 per cent lower than for 2016 and by this reduction being primarily due to SHK having had lower staffing costs for the group investigators in 2017 than in 2016. The difference is also explained by the fact that the costs for services from the National

Government Service Centre were SEK 200,000 higher in 2017 than in 2016 due to a change in support system.

Other measures to increase efficiency

In addition to the key performance indicators above, in the following an account is given of other significant measures implemented in order to increase efficiency and improve economic management in the future.

SHK's operations management system

SHK's efforts to introduce a comprehensive operations management system are nearly complete and will be fully implemented in early 2018. The operations management system clarifies how SHK's operations function and create a comprehensive view in which the core activities and support functions are well-defined and the division of responsibility is clear. Furthermore, the system is expected to facilitate the dissemination of knowledge and more uniform working practices, as well as reducing unnecessary administration. An effective operations management system will also lay the foundations for suitable procedures for follow-up and evaluation of operational performance.

The operations management system is published in its entirety on SHK's intranet and is easily accessible to all employees at SHK.

Electronic case management system

SHK has had an electronic case management system since January 2014. In order to further improve the efficiency of the authority's case management, SHK requested permission from the Swedish National Archives (Riksarkivet) to destroy paper documents once they have been scanned and stored in SHK's case management system and electronic archive (e-archive). The National Archives decided on 14 September 2016 to grant this request. This decision came into force on 1 October 2016 and facilitates SHK's continued work towards completely digital case management. The new procedures were introduced on 1 January 2017. In 2017, in order to achieve the goal of having completely digital case management, SHK commenced work to supplement the case management system with an electronic signature function. This work is to be concluded in 2018.

Increased costs for services from the National Government Service Centre

The authority has in one regard been unable to secure an effective use of resources. SHK purchases wage and finance administration services from the National Government Service Centre (SSC), as prescribed by the Government. However, engaging SSC has entailed considerable cost increases and efficiency decreases for SHK.

In 2014, SSC changed its price model from a fixed-price model to a model with current prices, which in a single stroke led to a cost increase for SHK of SEK 100,000 per year. At the end of 2016, SHK received a new agreement proposal from SSC, once again with a new price model and with further cost increases of SEK 260,000 per year.

SHK deemed the cost increase to be entirely unreasonable but, despite several requests, has received no clarification from SSC of the link between the raised fees and specific services. There was also no initial willingness on the part of SSC to negotiate on the requested changes in pricing as is prescribed in the agreement between the agencies. Finally, however, SHK succeeded in having the fee changes implemented in accordance with what is prescribed in the current agreement between SHK and SSC. The price model from 2014 has therefore continued to be applicable to SHK in 2017. The new price model with new higher fees entered into force on 1 January 2018.

In 2019, SSC's framework agreement for the wages handling system will expire, and this will entail further cost increases. SSC estimates that SHK's costs for introducing a new wage handling system will amount to SEK 500,000, distributed over five years.

Overall, this means annual fixed cost increases of 69% compared with the previous fixed-price model that applied until 2014, and of 47% compared with the agreement that applied until 2017. The very large cost increase is not matched by any improvement in service for the authority, but rather on the contrary. The effectiveness and quality of SSC's services have deteriorated. Together with other agencies, SHK has approached the Ministry of Finance and called attention to the unreasonableness of the National Government Service Centre's price increases and poorer quality performance.

2.3.6 *Costs in total figures*

SHK has chosen to report the costs for 2017 separating specific investigative costs and general operational costs. Specific investigative costs are costs directly attributable to individual investigations, and general operational costs are costs for staff, training, intelligence, collaboration with other safety authorities, premises management and other running costs which are not directly attributable to any particular investigation.

Specific investigative costs

Table 1. Specific investigative costs (SEK, thousands).

Year	Civil maritime	Rail	Civil aviation	Military events	Other events	Total
2015	795	85	1,389	362	482	3,113
2016	452	39	2,010	676	1,356	4,533
2017	508	334	805	213	692	2,552

The specific investigative costs are event-driven and are determined primarily by which investigative initiatives are required and how much support from external consultants is required for ongoing investigations and investigations concluded over the course of the year.

SHK's specific investigative costs have decreased by SEK 1,981,000 compared with the previous year. The decrease primarily relates to consultancy costs and travel costs and is explained by the fact that ongoing and concluded investigations in 2017 have not been as resource-intensive as those in 2016. In 2016, SHK had two investigations that required quite a lot of consultancy and travel, namely the fatal mail cargo aviation accident in Oajevágge in Jokkmokk municipality in the arctic areas of Sweden and the accident involving a wind turbine in Lemnhult, Vetlanda municipality.

The cost increase of SEK 295,000 in the rail area is explained by the investigation into a derauling in Ludvika requiring a relatively great degree of support from external experts.

General operational costs

Table 2. General operational costs (SEK, thousands).

Year	Civil maritime	Rail	Civil aviation	Military events	Other events	Total
2015	13,254	6,300	13,062	3,979	2,425	39,020
2016	10,651	3,713	20,036	3,742	2,995	41,136
2017	10,686	4,867	12,750	6,220	5,245	39,768

SHK's general operational costs have decreased by SEK 1,368,000 compared with the previous year. This is primarily explained by the fact that costs for staff and professional development were lower in 2017 than in 2016. The comparatively lower costs for staff are explained by the fact that four investigators left their positions in 2017. For two of these, work to recruit replacements has been concluded in 2017, and work to replace one further investigator will be concluded in 2018.

The distribution of these operational costs is also event-driven in the sense that they are distributed between the different transport modes and investigation areas on the basis of the respective number of working hours spent in each area.

In civil aviation, general operational costs have decreased by SEK 7,286,000 compared with the previous year. This is largely explained by the aforementioned fatal mail cargo aviation accident in Oajevágge in Jokkmokk municipality requiring major staff contributions in 2016. Besides this, a number of SHK's aviation investigators have been involved to a greater extent in investigations within the military area in 2017. Correspondingly, the costs in the military area have instead

increased by SEK 2,478,000 in 2017. SHK's aviation investigators have also participated in the area of other accidents or incidents, which is also a factor contributing to the decreased costs in the area of aviation.

The cost increase of SEK 2,250,000 in the area of other accidents or incidents is largely explained by the fact that SHK has used expertise from other investigation areas both for the aforementioned bus accident and in the investigation involving the wind turbine in Lemnhult in Vetlanda municipality that was concluded in 2017.

The cost increase of SEK 1,154,000 within the rail area is explained by there being more ongoing investigations in the whole of 2017 in comparison with 2016.

Total costs per investigation area

Table 3. Total costs (SEK, thousands).

Year	Civil maritime	Rail	Civil aviation	Military events	Other events	Total
2015	14,049	6,385	14,452	4,340	2,907	42,133
2016	11,103	3,752	22,046	4,418	4,351	45,670
2017	11,194	5,201	13,555	6,433	5,937	42,320