**Air transport regulation under transformation: the case of Switzerland**

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Abstract

Over the past five years, the Swiss air transport sector has witnessed an unprecedented number of accidents and incidents, leading to an independent analysis ordered by the government. The resulting report of 2003 identified significant regulatory and institutional deficiencies with direct implications for safety. The challenges to Switzerland's institutional regulatory framework were further exacerbated because of the bankruptcy of the Swiss national flag carrier (Swissair in 2002) and the pressure on Zurich Unique airport resulting from of a new overflight regime in Germany in 2003. On the basis of this report, the government has ordered a profound transformation of the Swiss institutional regulatory framework, among which the transformation of the Swiss Federal Office of Civil Aviation (FOCA) into a regulator, whose predominant concern must be safety. This paper presents and critically analyzes the current transformation of the Swiss institutional regulatory regime against both regulation theory and safety performance criteria.

Keywords: regulation, air transport safety, institutional regulatory framework, Swiss Federal Office of Civil Aviation (FOCA).

## 1. Introduction

The Swiss air transport sector has been struck, since the late 1990s, by a series of severe accidents. One may recall the crash of an MD-11 Swissair near Halifax in September 1998, the fatal accident of a Crossair Saab 340 in January 2000 and of another Crossair Avro 146 RJ, both near Zürich Airport, as well as most recently the mid-air collision on July 1st 2002 near Überlingen (Germany) over Swiss air space. Simultaneously, the Swiss National Bureau of Accident Investigation (AAIB) had reported various cases of nearmisses, as well as shortcomings in Air Traffic Control equipment.

In response, the Swiss government had commissioned NLR, the Dutch Airspace Laboratory, with an external evaluation on the safety of air transport in Switzerland (NLR, 2003). The main objective of this evaluation, of which the two authors were part, was to analyze whether the current structures for ensuring aviation safety within Switzerland were appropriate, and make recommendations as to how to improve them. And indeed, the report showed that the safety performance of Swiss aviation over the last decade had been declining, whereas the safety performance of the other European states had been improving. Where Switzerland had clearly been ahead of these states before the 1990s, this lead had been lost, and a negative trend had set in. The purpose of this article is not re-analyze safety performance of the Swiss aviation sector, nor summarize the findings of the NLR report, which is publicly available.

Rather, this article focuses on one of the conceptual aspects treated in the NLR report, namely on the institutional dimension of air transport safety. While it uses the NLR data and is grounded in the Swiss case, our argumentation is more general, as we seek (1) to the

conceptualize an ideal institutional framework for regulating air transport safety, and (2) to design a organizational/institutional transformation process, by which such a framework can be reached.

Our article is thus structured as follows: in a first section we briefly recall the problem, i.e., the declining safety performance in the Swiss air transport sector and the corresponding institutional problems, as identified in the NLR report. In a second section we will frame the problem in terms of regulation and corresponding regulatory institutions. In this section we will also develop an ideal institutional safety regulation framework. In the third section we will outline the institutional and organizational transformations needed in order to address to reach this ideal framework, again by referring to the Swiss case.

## 2. Diagnosis: declining safety and its institutional root causes

The purpose of this first section is to identify the problem as one of so-called "safety performance". Such safety performance – as will be argued in the next section – is considered to be the result of corresponding public policies and subsequent implementation by means of corresponding institutional arrangements. This section will therefore also highlight the institutional problems, as identified in the Swiss case.

Over the past five years, the Swiss air transport sector has witnessed an unprecedented number of accidents and incidents. Air transport is an exceptionally safe mode of transport. Hence even a (temporary) increase in the number of accidents does not necessarily imply an unacceptable performance deficiency in absolute terms. However, public opinion in general

and the judgement of the travelling public in particular, is not based on safety performance in absolute terms, but on safety performance in relative terms, both over time (expectancy of continuous improvement) and in comparison to relevant international performance. As shown in the figure below, Swiss air transport has not faired well on both dimensions. Not only does the accident rate (number of accidents per million flights) gradually increase over the last two decades but also the trend in safety performance in Switzerland (declining) is contrary to the worldwide trend (improving) and the trend in a smaller set of benchmark states (France, Germany, Netherlands, improving).

Figure 1 approximately here

The Swiss Accident Investigation Bureau also shows, in its 2003 report (BFU, 2004), a significant increase of accidents and serious incidents of Swiss registered aircrafts (2002: 15; 2003: 33) and of foreign registered aircraft in Switzerland (2002: 3; 2003: 11). The following table indicates Airproxes, i.e., Air Traffic Incident Reports including risks A (high risk of collision), risks B (possible risk of collision), and risks C (no risk of collision).

Table 1 approximately here

When the NLR report was released the figures for the year 2003 had not been available, showing yet another significant increase in incidents, in particular in risk A incidents. The trend already identified by NLR has thus not been reversed.

Also, it is important to point out that accident and serious incident statistics constitute a reactive indicator of the safety performance of the industry. While monitoring and analyzing accident and incident data is certainly necessary, it is obviously not an adequate basis for pro-active safety management. If safety trends in the industry are to be formally identified before accidents and incidents occur, an appropriate set of safety performance indicators must be developed and used. And this is something which should be done by the safety regulator (see below).

Safety performance as measured by accidents and incidents is of course the result of a combination of factors, not all of which have clear root causes. For example, declining safety performance can also result from growing traffic. Therefore, only benchmarking with other countries shows whether overall safety performance has or has not improved. In the case of Switzerland, however, safety performance has clearly declined, whereas it has increased on average in the rest of the world.

The NLR report attributed this declining safety performance to institutional root causes (see next section), in particular to deficiencies in terms of regulatory institutions and behavior. More precisely, the NLR report had identified six such institutional root causes or problems, five of which we will briefly recall here:

- the absence of national aviation <u>safety policy</u> and corresponding action plan, which would define clear targets in terms of safety performance and attribute corresponding institutional responsibilities for implementing it. From a public policy perspective, this is of course the primary root cause. However, we will not further address this issue, as our primary interest is on the institutional aspects. A national aviation safety policy, if it were to be developed, should simply take these institutional aspects into account (see chapter 3 below).

- The absence of a clear <u>supervision of FOCA</u> (Federal Office of Civil Aviation) by the Ministry and corresponding responsibility. Indeed, it appeared that FOCA was neither properly instructed, nor controlled by the Ministry. This is an aspect we will discuss in more depth in chapter 4.

- The absence of a clear separation or a clear identification of safety related issues and corresponding responsibilities within <u>FOCA</u>. Indeed, it appears that safety was pervasive all throughout FOCA without however clearly identifying an overall responsibility for safety and safety performance. We will discuss this aspect in further detail in chapter 4 as well.

- The existence of a federal accident <u>investigation commission</u> (called EFUG) on top of the AAIB, and which significantly delays recommendations by the AAIB and dilutes responsibilities. This is an institutional root cause, which will briefly be addressed in chapter 4.

- A wrong <u>reporting structure and process</u>, whereby the AAIB reports exclusively to FOCA, rather than to the Ministry. This is related to the fact that the recommendations did not legally oblige the concerned actor to take the AAIB recommendation into consideration. This is an institutional and legal problem, which will briefly be addressed in chapter 4.

The following figure summarizes the original institutional framework of Swiss air transport safety, as identified at the time of the NLR report.

Figure 2 approximately here

We have summarized in this chapter the safety performance problems of the Swiss air transport sector and the corresponding institutional (and organizational) root causes as they were identified by the NLR report. In the next chapter, we will now discuss the conceptual framework linking safety performance to regulatory institutions.

**3. The regulation of air transport safety**

In this chapter, we will therefore present an ideal institutional framework for air transport safety. Such a framework must be put into the larger context of the transformation of the air transport sector over the past 30 years, during which competition has gradually been introduced. It is this transformation of the sector which indeed leads to the fact that safety is

no longer a concern of the (only) historical operator (enforced, if at all, by ownership), but becomes a public policy concerned to be enforced by means of regulation. The following figure summarizes this evolution in the case of Switzerland.

Figure 3 approximately here

In the remainder of this chapter we will present an ideal model for regulating air transport safety, as this becomes necessary in an increasingly competitive environment. This model is grounded both in public policy and in regulation theory. Both theories have been adapted to air transport in general and to air transport safety in particular.

Public policy theory distinguishes between (1) public policy objectives, (2) the implementation of such public policy by the government in collaboration with its administration, (3) the outputs of this administration (e.g., administrative decisions, subsidies, etc.), (4) the impacts of these outputs on the relevant operators with the aim of changing their behavior, and (5) the policy outcomes. Ideally, the policy outcomes should correspond to the policy objectives, all intermediate steps being a simple means for achieving such public policy objectives. Ideally, therefore, there exists an overall safety policy – or an air transport policy of which safety is an integral part –, whose outcome precisely would be safe air transport.

Regulation is therefore an instrument of the public policy implementation process. Regulators (e.g., the competition regulator or a sectoral regulator) are one among several actors

contributing to the implementation of any given public policy objective. All these actors of course interact and thus constitute an institutional arrangement, by which a public policy is being implemented.

In liberal political systems, regulation pertains primarily to economic efficiency, meaning that the main regulatory activity is competition regulation. In the network industries however – of which the air transport sector is entirely part – regulation pertains yet to other, additional functions. Let us mention here, in particular, the function of attributing the scarce resource, i.e., in our case the slots and the routes.

Safety in the air transport sector is typically part of these two regulatory functions, namely of allocating the scarce air space (e.g., airplanes must observe a certain critical distance) and of ensuring the system's integrity (there must be smooth functioning of the overall air transport system by ensuring interoperability and the respect of safety and other industry standards). In addition and beyond ensuring such system's integrity, one could also consider that safety is a public service concern.

From the above elements, we can now deduce what we call a "public policy mechanics" for air transport safety regulation. In addition to the above considerations, we introduce here the fact that many public policy objectives are not defined at a national, but rather at an international level, notably by ICAO, ECAC, and Eurocontrol. National public policy is then simply limited to translating these objectives into national laws and norms. However, this does not change anything in the mechanics itself: institutional arrangements among relevant actors – among which a (safety) regulator – then implement these safety (policy) objectives by means of standards and controls of these standards. Such standards impact upon the

various operators (e.g., airports, airlines, air traffic control, and others more), thus leading, in

theory, to the desired (safety) outcomes. Figure 4 summarizes this approach.

Figure 4 approximately here

If one now looks at the specific role of the AT regulator (also called the "sectoral regulator"),

one can come up with a much more detailed air transport regulation model, as we call it. This

model puts the AT regulator in the center of the institutional framework charged with the

implementation of the air transport (safety) policy. Let us explain this framework in little

more detail:

- in order to contribute to the implementation of its (safety) policy objectives, the

  regulator will impact upon the various operators active in the sector. These are the air

  traffic control operator, the airlines, and the airports. One could add to this list yet

  other operators, such as aviation training institutions, and equipment providers. The

  regulator will impact upon these operators by defining standards (of operations) and

  by controlling whether these standards are met. In most cases, these standards are not

  defined by the regulator, but by policy actors such as the national legislator or

  international legislatory bodies (e.g., ICAO, Eurocontrol). However, the monitoring

  of the compliance remains generally the task of the regulator.

- Airports and air traffic control through their operations, in turn, impact upon the airlines, thus indirectly also implementing (safety) policy objectives. The role of the regulator is, in this case, to supervise their operational procedures and activities.

- If the regulator observes among the operators behavior, which is deviating from the standards, it should intervene by forcing the operator to correct – thus the term "regulator" – its behavior. In order to do so, the regulator ideally has at its disposal a set of mechanisms – both incentives and sanctions –, ranging from rewards via warnings and fines to the withdrawal of the license, i.e., the right to operate.

- If, despite of this regulatory approach, accidents (or incidents) occur, there exists yet another corrective loop in the air transport industry, namely the "independent accident investigator". Contrary to the regulator which acts ex-ante, the accident investigator acts ex-post, i.e., comes to play its role only once an accident (or an incident) has occurred. It then investigates the behavior of the concerned operators, but also of the regulator. Indeed, if an accident occurs, this may be due to two different reasons: either the regulator has behaved properly, but (safety) policies were not sufficient, or safety policies were sufficient, but the regulator has not ensured their implementation. This is why the independent investigator must report to the political authorities, as they are in charge of both defining the policies and of supervising the regulator.

- Furthermore, ideally, the regulator must be separate from policy advise. Policy advise is generally done by an administrative office and has as its function to prepare policies, which the political authorities then adopt and the regulator implements. It

could indeed happen that such policies – for example as a result of a recommendation

issued after an accident – pertain to the better supervision of the regulator.

- Finally, as civil and military aviation are generally structured into two separate
  ministries, there exists separate policy advise for each of them. However, ideally, the
  regulator should not be separate, as there should exist one integrated civil and military
  air transport (safety) policy.

The following figure summarizes the above arguments graphically.

Figure 5 approximately here

**4. Transformation needed**

In this chapter, we will link the NLR diagnosis on the institutional and organizational

deficiencies to the above ideal model. To recall, five such deficiencies have been identified,

the first one pertaining to policy (and which has been treated in the previous section), three

pertaining to institutional relations and one pertaining to the organization of FOCA.

As for institutional relations, the following three deficiencies had been identified by the NLR

report. We will recall them here and outline the remedies, which were then reflected in

NLR's recommendations:

- Let us mention here first the wrong <u>reporting structure and process</u>, whereby the AAIB reports exclusively to FOCA, rather than to the Ministry. Subsequently, the so-made recommendations did not legally oblige the concerned actor to take the AAIB recommendation into consideration. Quite logically, and in line with the above ideal institutional framework, NLR recommended to change the Ordinance on accident investigation so that the AAIB formally reports to the Minister of Transport instead of to FOCA, and that a legal obligation rests upon the actor addressed in an AAIB recommendation to take the recommendation into consideration and to report back to the Minister of Transport.

- Let us secondly mention the absence of a clear <u>supervision of FOCA</u> (Federal Office of Civil Aviation) by the Ministry and corresponding responsibility. To recall, FOCA was neither properly instructed, nor controlled by the Ministry. Quite logically then the NLR again recommended to establish a position within the Ministry of Transport to monitor the (safety) performance of FOCA, to act on behalf of the Swiss government in aviation policy matters, and to act as the delegated accountable manager of the Minister with regard to the implementation of the recommendations of the AAIB.

- Let us finally mention the existence of a federal accident <u>investigation commission</u> on top of the AAIB, which significantly delayed the recommendations made by the AAIB and diluted the responsibilities. Here, NLR simply recommended to discontinue the recourse process.

As for the <u>organizational dimension</u>, let us recall the main deficiency identified by the NLR report, namely the absence of a clear separation or a clear identification of safety related issues and corresponding responsibilities within FOCA. Indeed, one could expect that it is important for an organization like FOCA, which has safety as the primary objective, that the organization somehow reflects that. This is, however, not the case, as safety was not identified anywhere in the organization chart. Safety was considered everybody's job and not the responsibility of a particular individual. Basically, the act of regulation was and perhaps still is considered as a form of safety management since the purpose of regulation is to ensure safety. This approach is, however, a reflection of the "old way" of achieving safety through administrative compliance. Today's high levels of safety in the very complex and rapidly growing aviation industry cannot be sustained unless a proper safety management approach is adopted. The associated changes in processes should also be reflected in changes in the organizations of the government agency (i.e., FOCA) overseeing aviation. While there is merit in making every employee aware of his or her personal responsibility for the safety aspects for the job, the effectiveness of such statements is limited unless it is administered in an organization where safety is the product and top-level management is accountable for that.

FOCA is currently charged with both the promotion of aviation and safety. However, as long as these objectives remain subject to an implicit consideration at the level of the director of FOCA, the manager who is solely accountable for safety cannot be identified in the organization. Indeed, the total integration of these duties, as is currently the case in FOCA, presents serious risks in combination with the lack of a clear safety policy, accountability and culture. The integration means that the considerations and trade-offs around safety and economy are now made at the level of the individual employee. NLR therefore recommended a substantial organizational transformation process by which FOCA should evolve into a

separate unit for Safety Regulation and another separate unit for Aviation. It could be admissible that both units report to an overall director of FOCA, but each of these two units should have their own director.

From an international perspective, this organizational structure of FOCA is also rather unique. Indeed, the organization charts of most other regulators reflect the primary regulatory tasks. In the UK, for example, the Safety Regulation Group and the Economic Regulation Group, each with own director, together form the CAA. "Chinese walls" separate these two groups within the CAA. In the Netherlands, the safety regulator and the policy group have been physically separated into different units reporting to different Directors General of the Ministry of Transport. While this provides a clear separation between safety regulation and policy, it has disadvantages too, mainly with regard to the application of domain knowledge in policy development. The Australian authority also underwent significant change in the area of safety regulation in the mid-nineties in response to the (perceived) need to clearly separate Safety Regulation from the other tasks of the Aviation Authority (Civil Aviation Safety Authority, 2001). The Australian Authority was at that time under strong pressure to become a smaller and more efficient government agency and at the same time a number of fatal accidents occurred in which the role of the (safety) regulator was implicated in the causal factors of the accidents. As a consequence, the resources of the authority were slashed by 50% over a five year period, and the safety regulation activities, which were initially already a Division of the CAA, went through considerable change. Safety Regulation staff were reduced from 736 in the beginning of 1991 to 490 by the end of 1992. CAA management rejected a recommendation from one of a range of investigations and inquiries to the effect of setting up a separate Safety Regulation Directorate within the CAA. Public scrutiny however led to the demand upon the Authority to formally confirm that safety has

primacy in CAA's work and the establishment of a Directorate of Aviation Safety Regulation. A further fatal accident in which the oversight of the CAA was implicated prompted the government to take further action and led to the decision to establish a separate Aviation Safety Agency within the CAA. A next accident led to the removal of the director of the Safety Regulation Division and the decision to set up a new and separate Aviation Safety Agency, and to considerably increase funding for safety regulation. This agency became today's CASA (Civil Aviation Safety Authority).

## 5. Conclusion

This article did and does not have as an objective to assess the institutional and organizational transformation process of Swiss aviation safety regulation. Rather, its aim was to present and argue for the conceptual framework underpinning the recommendations that were made by the NLR report in institutional and organizational terms. We think that this conceptual framework is a solid one and that it is furthermore confirmed by examples of other countries.

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