A Comparison of Electronic Infrastructures in the Air Cargo Industry in the Netherlands and Hong Kong SAR

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Reasons behind the failure and success of large-scale information systems projects continue to intrigue researchers. In particular in the airline industry very successful (passenger reservation) systems have been built which have totally changed the competitive arena of the industry. On the cargo side however attempts to implement large-scale community systems have largely failed across the globe. Air cargo parties are becoming increasingly aware of the importance of IT and, increasingly, they understand the value that IOS could provide for the total value chain performance. However, whereas in other sectors IOSs have been very successful, there are only fragmented examples of successful global systems in the air cargo community and the penetration of IOS in the air cargo industry is by no means pervasive. This paper describes the genesis and evolution of two IOSs in the air cargo community and identifies plausible explanations that lead one to be a success and one to be a failure. It draws on extensive fieldwork in Europe and in Hong Kong SAR that is complemented by secondary data analysis of relevant trade and company literature. We argue that in these two cases the complex, institutional and technical choices by the initiators of the system in terms of their competitive implications that were the main causes for the systems failure. The paper thus concludes that it was the institutional factors involved in the relationships of the stakeholders that led to the opposite manifestations of the two initiatives, and that such factors should be taken into account when designing and implementing large-scale information systems.

INTRODUCTION

The factors defining the success and failure of large-scale information systems developments have been the subject of many studies over the last two decades (Markus, 1983; Robey et al., 1993; Kwon and Zmud, 1987; Christiaanse and Huigen, 1995; Damsgaard and Lyytinen, 1998; Monteallegre and Keil, 2000). In 1982, Barret and Konsynski labeled interorganizational systems as IOSs and studied them as a class of their own. Since then the role and impact of IT in inter-firm relationships have been demonstrated to have significant impact on business processes and relationships along the supply chain (e.g. Clemons and Row, 1989; Zaheer and Venkatraman, 1994; Short and Venkatraman, 1992; Bakos, 1991; Christiaanse and Kumar, 2000; King and Konsynski, 1990).

IT provides new ways of acquiring, disseminating and utilizing information in interfirm settings that can impact the governance structure and integration level in vertical relationships. System implementors therefore need to focus on the unique knowledge and insights of organizations and manage inter-organizational relationships. Prior research has focused more on the role of physical asset specificity due to the presence of dedicated systems (Christiaanse, 1999). Some later studies have gone further to focus on the role of systems in creating process specificity (Zaheer and Venkatraman, 1994).

Just as in other sectors, there is a growing interest in IT in the air cargo community. While most in-house functions became IT supported and re-engineered in the 1980s and in the early 1990s the air cargo community is currently looking beyond organizational boundaries to identify further improvements. Air cargo parties are becoming increasingly
aware of the importance of IOS, and they understand the value that IOS could provide for the total value chain performance. In recent years, many industries have undergone dramatic changes as a result of IT both within organizations and across. However, whereas in other sectors IOS has scored big successes, there are no real signs of deep penetration in the air cargo community yet. Although a large number of attempts have been made to automate air cargo processes across stakeholders, it seems that there is really no one single system or dominant design that truly fits the air cargo process structure and the demands of all air cargo parties (Christiaanse, O'Callaghan, Been and Van Diepen, 1995).

As Wrigley et al. (1994) convincingly point out the international cargo community is very complex. In spite of this complexity, there has been a shortage of research with a focus on the air mode of transport, as compared with other modes of transport such as civil aviation. In particular, passenger air transportation has been one of the most prominent examples of the use of IT/IOS for strategic advantage and electronic integration (Copeland and Mckenney, 1988; Christiaanse, 1994). The passenger reservation systems have provided airlines with considerable competitive advantages, because airlines gained considerable influence and control over their distribution channels (Bakos, 1991).

It is in fact, very surprising that in contrast to passenger reservation systems these air cargo community systems have been mostly failures, not only in Europe but in the US and Asia as well (Forster and King, 1995; King et al., 1994). This is also true in the air cargo business, where there have been numerous initiatives to replicate the success of Computerized Reservation Systems (CRS) and the implications such systems had on airline performance and marketing practices. However, none of the cargo systems has been able to replicate the success of the 1980s US-based CRSs (King, 1995a; King, 1995b; Meecham and Proctor, 1990).

In the situation as it exists, the air cargo community seems to be trapped in its own information technology infrastructure and power dependency. The web of networks, systems, computers, programs and procedures has weighed heavily on investment capacity without bringing any really positive results (Christiaanse and Zimmerman, 1999). The present information technology does not seem to fit the structure of the air cargo process and the demands of the market, resulting in a sector with ‘under-utilized’ technology and a deep need for new systems properly adapted to the community as a whole.

**Objectives and Approach of the Study**

The objective of this research study is to describe and compare two different mini case studies in the air cargo community in such a manner as to examine the underlying causes for information technology systems’ ‘failure’ or ‘success’. We provide an insight into the existing information systems and the evolving dynamics in the air cargo communities; we then analyze a set of determinants underlying the different outcomes of both initiatives. These issues are compared and explored from a theoretical institutional perspective. The basis of the empirical data was primarily obtained in exploratory fieldwork conducted in the European and Hong Kong air cargo community. The Dutch fieldwork involved over 25 interviews with key players in the industry over a two-year period. The Hong Kong case study involved 15 interviews with key stakeholders covering the period from 1994 to 1998. The field study data was complemented with extensive secondary data such as company reports, newspaper clippings and other available material. The method was inclusive and it did not assume predefined hypotheses but instead was meant as an exploratory investigation into the challenges the air cargo community was confronted with.

**THE AIR CARGO CHAIN AND PARTIES INVOLVED**

Time is the single most important factor in an industry where the distribution of goods moves close to the speed of sound. In the early 1990s, the average shipment time for airfreight was six days. Of that time, ninety per cent was spent on the ground. The need to coordinate, streamline and optimize all the ground-based activities in the air cargo community is clear.

Based on weight, air cargo only accounts for one per cent of total general cargo transport. However, based on the market value of goods, the share amounts to approximately 25 per cent. Of the total $200 billion in world-scheduled airline operating revenues, the air cargo industry represents a relatively small share at around $30 billion (McCarthy, 1986).

As early as 1975, the International Air Transport Association (IATA) concluded that for 78 per cent of its total travel time, air cargo is at the airport “waiting” for transport and there are no clear signs that there has been much improvement since (Been & Van Diepen, 1995). According to IATA, this inefficiency was caused mainly by the lack of communication and integration of administrative processes on ground. It was expected that predefined document standards would reduce data-entry and re-keying of information and that coupling cargo and accounting systems would speed up billing processes by checking space availability, bookings, and reporting procedures.

We will address the fact that it might not be the available technology that is wrong or that the air cargo community is short on talent to produce such IOS, but argue that the issue is the *nature of the business* instead of the *nature of the technology* or available talent, as also indicated by King (1994) and Ritz (1995). To provide more insight into the nature of the air cargo business, we will discuss the important dynamics in this business network.

The black arrows in Figure 1 refer to the physical movement of cargo between the parties in this network while...