Decisions taken to purchase either new passenger or cargo aircraft often tie up millions, even billions of dollars, for decades. The influence of buying centers, institutions and environmental developments on buying decisions shall be examined in this paper. Making use of empirical data, we shall give recommendations for the effective constitution of a selling center, and suggestions for an efficacious aircraft producer communication policy.

**Aim of the Paper**

This paper is aimed at providing insight into the world market for passenger aircraft with a seating capacity of at least 100 persons, or cargo aircraft of a similar size. Our examination is, therefore, restricted to a duopolistically competitive global market composed of the Boeing Commercial Airplane Group and Airbus Industry. There are, however, production capacities of this sort in the former Soviet Union, but these play only a marginal role in global terms (Airclaims Turbine Airliner Fleet Survey 1997). Of primary concern in this study are the purchasing decisions for such new aircraft. Our survey, which was designed with the help of representatives from both the manufacturing and the airlines’ side, was directed towards airlines that possessed a minimum amount of aircraft in the aforementioned category, or had ordered a certain number of these aircraft. To select appropriate objects which render influence over buying decisions and areas requiring examination in the global market for large aircraft, the recommendations and wishes of persons involved directly in the industry played an important role; these coupled with the academic literature on models of industrial purchasing arrangements inspired the approach finally chosen.

The following all showed themselves to be both empirically verifiable and of fundamental practical importance: the duration of purchasing decisions related to certain buyclasses; the amount of persons that on average influence purchasing decisions; the influence of environmental factors, external institutions and groups; the structural arrangements of buying and selling centers, and the communication forms and information sources selected by airlines.

**The Empirical Approach and Database Adopted**

In order to gain better insight into the structure and process of decision making in the aircraft industry, our research is directed towards airlines which had obtained at least five or more aircraft in their fleet from Airbus, Boeing or McDonnell Douglas, or had

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2 Before the beginning of this study there was a third supplier that fulfilled the criteria, namely McDonnell Douglas. McDonnell Douglas has in the meantime merged with Boeing which brought about this global duopoly.

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ordered at least three of such, at the time of selection. These criteria were fulfilled by 266 companies. Making use of a quota system (Aaker & Kumar & Day 1995, p174), every second airline was selected in order to keep regional distribution and fleet size representative. The survey strategy selected was that which, according to Aaker/Kumar/Day (1995, p235), has the following advantages:

- Relatively low cost
- Can be accomplished with minimum resources
- Enables access to regionally widely distributed samples
- Respondents have time to think the questions through and (if required) consult with others.

Because the aim of the survey was solely to have those persons participate which took an active role, or in future would take such a role, in organisational buying decisions, suitable contacts had to be ensured. Emerging from this, 133 companies were initially contacted per fax, telephone, letter or email for the purposes of selecting a manager suited to our requirements. After this preliminary request, contact was reciprocated by 75% of the envisaged companies. For the other companies, contact was established with managers, if one could deduce from title or position in the company that participation in purchasing was likely, enlisted in a sector specific directory (Aviation Week & Space Technology 1998, p235ff). After distributing the questionnaires and spending five months on field research, between May and September 1998, 34 airline managers had fully completed the 18 page questionnaire. This number is consistent with other surveys in this area (Hüttner 1998 p41). Accordingly, Airbus Industry and Aviation Industry of China acquired, in a survey of thematically a narrower nature and, therefore, presumably a shorter questionnaire, a return of 42 companies (Mecham 1997). The 34 completed questionnaires from a total of 133 originally contacted companies represents a response rate of 25.56%. The airline managers which responded represent companies which have a total of 2513 aircraft from the groups Boeing, Airbus and McDonnell Douglas. This corresponded to 21.67% of the world fleet of the target market. The average survey participant had over 17.5 years of work experience in the airline industry. Three of these had, in addition to this, work experience in the aircraft manufacturing industry. 70.6% of all respondents have a background in business or in economics; 35.3% have a technical background, whilst only one had legal training. Besides the purchasing of aircraft, 44.1% specialised in strategic planning. 20.6% each specialised in controlling and cargo traffic and 14.7% in either customer service, marketing, sales or technology.

A general, comprehensible differentiation of the respondents position in management was required, so the survey correspondents were asked to select from three available options their position in the firm, which served as an indication of the hierarchical distribution of the respondents. They chose, for functional purposes, either a positions of lower, middle or top management, because the exact tasks and roles of employees may vary according to cultures and companies. The results of which showed that half of the correspondents believe themselves to belong to positions of top management in their airline; 32.4% to middle management positions, and the rest to a lower management position. The management position was randomly checked for plausibility by making use of letter headings and business cards. There was no indication, arising therefrom, to

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3 The structure and procedure of purchasing arrangements were only one theme of the research project. Prognosis and information concerning expected changes in demand and strategic and operational marketing in the aircraft industry were also collected.

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doubt the accuracy of the answers. The desired representation, with regards to fleet size and regional distribution, was to a large extent fulfilled by the quota system employed. Large and very large companies, as well as Australian and European companies, are slightly overrepresented. These effects shall always be partially felt by use of such small bases and sample sizes, i.e. considering the number of persons which function as respondents.

The Survey Evaluation Strategy

The evaluation of the survey results is principally one of a descriptive nature. Should the questions have been answered by the survey correspondents according to a closed rating scale, then these results shall be presented in the form of mean values. This approach leads to a condensing of the individual answers without taking size, and especially that of the fleet size, of a company into consideration. In order to give reckoning to the potential differences in demand of individual airlines, an aircraft based measurement is also used, whereby mean values according to the number of aircraft are adopted. Whilst the first approach stresses the importance of smaller airline companies, the second gives more weight to the larger companies by taking size into account; from the point of view of the aircraft producers, which respond to demand, this should be viewed as more important. This approach dominates over one which is based on values attached to categories, as it on the one hand largely ignores groups which are of insignificant size, and on the other hand, maintains expert opinion which can be presented in the results. Results presented here shall be in both aircraft based evaluation and airline based evaluation form. Additionally, questions with restricted choices, e.g. yes no-questions shall also be incorporated into the presentation according to airline and aircraft based evaluations.

Findings of the Paper

The Duration of Buying Decisions

According to Robinson, Faris & Wind (1967, p25) one can distinguish between decisions to purchase a completely new class of aircraft, i.e. a type which was never before in the fleet (New Task), decisions to purchase a type of aircraft where a previous model or its derivative is already in use (Modified Rebuy), and decisions to purchase an aircraft type which is already in operation (Straight Rebuy). The purchase of a fully new aircraft takes on average one year (52.07 weeks), applying the airline based evaluation method. If one takes the size of the fleet of the companies into consideration (an aircraft based evaluation) one receives a value of slightly more than one year (54.19 weeks). The minimum amount of time given by any one respondent was 12 weeks, the maximum 150 weeks. For modified rebuy (aircraft type or model derivative), identified by the second category mentioned above, the mean value was 29 weeks under an airline based evaluation. The aircraft based evaluation gave a slightly different result, namely 27 weeks. The minimum length of time given was 10 weeks, the maximum 70 weeks. For the identical resale of an aircraft already in stock, the mean value registered was 18.5 weeks under an airline based evaluation, or 13.8 weeks under an aircraft based evaluation.

4 To illustrate: Using aircraft based evaluations, the number of points an airline with 200 aircraft gives is simply multiplied by the factor 200 (the number of aircraft), the ones in a company with just 20 aircraft are only multiplied by 20. The average is the result of the sum of all multiplied individual values, which are divided by the number of planes which fall under the question.

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evaluation. The minimum amount of time reported was 4 weeks, the maximum 52 weeks. One can deduce from these results that larger airline companies take decisions to purchase aircraft identical to those already in their fleet much quicker than those of smaller size whereas there is no real difference in deciding time in the other buyclasses (Wilken 1999, p20).

The Number Of Persons Involved In Buying Decisions

The number of persons involved in decisions to purchase various models of new aircraft differs greatly among the companies represented in our survey. It fluctuates between as few as two and as many as one hundred persons. Using an airline based evaluation one finds an average number of 15 persons that exercise an influence on the buying decisions, or rephrased make up the buying center. Employing the aircraft based evaluation we see that on average 11.8 persons take part in this process, a number significantly lower. The representatives of the three largest companies stated that 10 persons, or less, exercise this ability. One can derive from this that larger companies are more sternly organised, concerning purchasing arrangements for new aircraft, and have a tendency to restrain the number of persons which can influence or are responsible for such arrangements.

The Influence of Environmental Factors and External Organisations on the Purchasing Process

Figure 1: Influence of Different Events and Developments on Purchasing Decisions (Wilken 1999, p21)

Environmental influences can bring about both constraints and opportunities. They influence the availability and performance of goods and services, the general economic conditions, the values and norms of business relations between organisations and the
flow of information within an organisation. Indeed, they shape the development of markets, as well as plans and decisions to purchase in these markets (Webster 1991, p43). Physical, technical, economical, political, legal and cultural factors can all exercise an influence. Consultation with representatives of the aircraft producers showed that the development of the demand for air traffic services, the introduction of more efficient aircraft types, the buying decisions of partner airlines as well as competitors; the environmental laws governing gas and noise emission; air traffic safety regulations, and age restrictions for aircraft in service may all be important. The respondents indicated, on a six point rating scale, the importance of these various factors and developments on organisational buying decisions. Economic criteria, such as changes in demand for air traffic and the introduction of more efficient aircraft types, proved themselves to be consequential. Laws governing noise reduction and age restrictions on aircraft already in service were also significant. A clear difference can be observed from the values given by the airline based and aircraft based evaluation; in the former, purchasing decisions of partner airlines and air traffic safety regulations were more influential than in the latter. Furthermore, age restrictions for aircraft already in service seemed to be more influential on purchasing decisions made by larger companies than by smaller.

![Figure 2: Influence of Institutions and Groups on Purchasing Arrangements (Wilken 1999, p22)](image)

Institutions and groups, external to the airlines can provide for environmental influences. Webster and Wind (1972, p14) identify business firms (suppliers, competitors, customers), governments, trade unions, political parties, educational and in McLaughlin, Damien. and C. Horan (eds.). Proceedings of The 15th Annual IMP Conference. University College, Dublin 1999
medical institutions, trade associations and professional groups as falling into the above. In our analysis of the global aircraft market, the influence of suppliers, governmental and state organisations, reference customers, labour unions, trade associations, customers of the airline, air safety regulation institutions, professional groups and external advisers are all appraised. External institutions and groups play only a *de minimus* role in purchasing decisions taken on new aircraft. As may be seen in the aircraft based evaluation this is especially true for the larger companies. Only the customers of the airline exercise a modest influence over the firms decisions.

As may be seen in the diagram, customers of the airline were more influential on the small to middle size companies than on the large reaching a value of 3.72.

**The Constitution of the Buying Center**

Webster and Wind (1972, p17-18) describe five units which make up the buying center:

- **Buyers**: Members of the organisation which carry the formal responsibility and authority to complete contracts of purchase.
- **Users**: Members of the organisation which use the purchased products and services.
- **Influencers**: Persons which influence the decision making process, either directly or indirectly, through providing additional information or criteria on the evaluation of available alternatives.
- **Gatekeepers**: The persons which influence buying decisions directly or indirectly through the provision of additional information or criteria on the costs and benefits of alternatives.
- **Deciders**: The persons which have the authority to select from the various offers.

![Diagram](image)

(Aircraft based) (Airline based)

**Figure 3: Participation of Different Persons in Purchasing Decisions (Wilken 1999, p23)**

The interaction of the various members in a buying center brings about a unique decision making process in each organisation. The uniqueness of the activity is guaranteed, due to the fact that many persons have some function, and some have more roles than one. It is very typical for a buying center that different interests lead to conflicts between the members (Büschen 1994, p5). An all incorporating measurement of the various influencing groups is, as a result of the above, difficult to perform.
general approach was therefore taken, whereby the respondents were given the aforementioned five categories belonging to the buying center and asked to indicate whether or not a particular category participated in buying decisions for large new aircraft. The amount of influence was additionally represented using a six point rating scale. Suppliers of large aircraft can use these results as an indication of where they should focus their communication efforts. Deciders are part of the decision-making process in all of the airlines that responded to this study. Users, for the most part pilots, crew members and maintenance personal, exercise their preferences 85% of the time. Buyers participate in about two thirds of all decisions. Gatekeepers have a greater role in larger companies, influencers in small and middle size.

The level of influence of the five groups identified differs substantially. Whilst deciders undoubtedly exercise the greatest amount of influence, users possess a medium amount of influence (especially in small and middle sized firms). Influencers and buyers exercise only a moderate influence. The moderate role of the gatekeepers increases somewhat in larger firms.

The Constitution of the Selling Center

<table>
<thead>
<tr>
<th>Influence Level</th>
<th>Buyer</th>
<th>User</th>
<th>Gatekeeper</th>
<th>Influencer</th>
<th>Decider</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aircraft-based</td>
<td>2.77</td>
<td>3.09</td>
<td>2.96</td>
<td>1.3</td>
<td>5.9</td>
</tr>
<tr>
<td>Airline-based</td>
<td>2.87</td>
<td>3.66</td>
<td>1.97</td>
<td>1.87</td>
<td>5.81</td>
</tr>
</tbody>
</table>

Figure 4: The Influence in the Buying Center (Wilken 1999, p24)

In addition to information on the constitution and influence structure in the buying center, it would appear to be important, from the point of view of the aircraft producer, which constitution of the selling centers is expected or desired by their customers. An optimally structured selling center obviously has the advantage of making interaction

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with members of the buying center easier. Individual needs specific to one contract or purchase can be better met. This is a prerequisite for the producing organisation, if it wants to present its products as being optimal for its customers (Puri & Korgaonkar 1991, pp313-314). The respondents clarified their preferences on the extent to which they desired members of the board, technical experts, business experts with an economic background and members with their own cultural background, as representatives of the supply side with whom they do business. Most of the companies expect technical and business experts as their bargaining partner. Approx. 80% desired the participation of members of the board of the aircraft supplier in the bargaining negotiations. The participation of members with a similar cultural background was only wished for by few airlines and should therefore be seen as only playing a small role in the bargaining process.

![Diagram showing expected participation of different parties in purchasing arrangements on the producer side.](image)

**Figure 5:** From Airlines Expected Participation of Different Parties in Purchasing Arrangements on the Producer Side (Wilken 1999, p25)

The following graph shows the structure of influence desired by the airline representatives. Whilst in the airline based evaluation the desired level of influence of persons with business expertise is the highest, larger airlines prefer technical expertise.
Relevant Communication Forms and Information Sources

The difference in information sources is a foundation for the Sheth model of industrial buyer behaviour (Sheth 1973, p50-53). It is on the one hand possible that different members of the buying center make use of different information sources with different amounts of intensity, it is on the other hand certain that each airline’s communication policy and flow of information under one another is different. The respondents, using once again a six point rating scale, indicated the importance of the various forms of communication. As a result of this we can derive starting points for the effective formation of a communication policy on the side of the aircraft producer. Making use of Sheth’s classification of information sources, the importance of professional and technical conferences, direct mailings, public relations of the producer, independent reports in the scientific press, exhibitions/airshows, journal advertising, and word of mouth communication were all tested. Instead of what Sheth considers an extra information source, namely salesmen, airline managers estimate the importance of direct communication similarly to the differentiation already existing in the selling center, i.e. business experts, technical experts, members of the board, and members of their own culture. The results clearly show that in the purchasing of new aircraft, personal interaction with technical and business experts on the production side is of utmost importance. Additionally, it can be seen that professional and technical conferences are also important. These events are induced by motivations for personal contact. Impersonal forms of communication such as direct mailing, public relations, and journal advertising are of moderate or less than moderate importance. A comparison between

\[ \text{Figure 6: The Desired Structure of Influence Airlines Prefer in the Selling Center (Wilken 1999, p26)} \]
the airline based evaluation and the aircraft based evaluation shows that personal contact for larger companies is of sizeably more importance than its impersonal counterpart.

Figure 7: Importance of Forms of Information Sources from the Point of View of the Demand Side (Wilken 1999, p.38)

Summary of the Most Important Results and Suggestions for Further Research

It has been shown in this paper that decisions to purchase new aircraft, that were previously not in the fleet, take on average one year. Should experience with this type of aircraft exist then this period may be reduced to a quarter of a year. The selection process is not made by any one particular person but by a buying center, which contains on average 12 persons. Environmental factors can exercise an influence on this process, or give rise to new considerations. Changes in demand for air traffic services, the introduction of more efficient aircraft types, noise protection regulations, age restrictions on aircraft already in service were all important in this category. The influence of external institutions or groups on the decision making process was only modest. Only in McLoughlin, Damien, and C. Horan (eds.), Proceedings of The 15th Annual IMP Conference, University College, Dublin 1999
the influence of the airline customers, which fly frequently, was seen as being of mid-strength. The final decision within the buying center rests with the so-called deciders. Users and buyers have the right to voice their own opinion. Gatekeepers and influencers are somewhat behind the above. Airline representatives wish to have persons with technical and business expertise as their bargaining partner from the production side; the participation of members of the board is slightly less frequently expected. These results are furthermore supported by the sources of information selected by airlines when considering the purchasing of new aircraft. Personal communication with the above mentioned groups dominates above all other sources of relied upon information. Professional and technical conferences, as well as word of mouth recommendations of colleagues from other airlines, were also seen as important sources of information. Our research starting point and aim was to generate information on the structure and process of decision making in the global market for large passenger and cargo aircraft. Preference was given to a more general approach, in order to indicate as many influence groups (and their sizes) as possible. Useful adjustments to future projects with similar intentions may include the differentiation of individual buyclasses (Belizzi & Walker 1980 and Crow & Lindquist 1985), or the different stages of the buying process when examining different influences (McQuisten & Dickson 1991).

References


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