

Improving Metropolitan Newspaper Home Distribution

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Abstract: The newspapers in the Nordic countries offer their readers a home delivered newspaper, often before 6 a.m. This helps the newspaper stay competitive as an information channel. But the distribution service is one of the most cost demanding processes of the newspaper companies, which is one important purpose for the distribution to be improved.

In this study metropolitan newspaper home distribution have been analyzed. Based on three case studies, involving Swedish morning newspapers with a circulation from 25 000 to approximately 400 000, the bottlenecks of the newspaper distribution have been identified. Areas of possible improvement have been found and a preliminary analysis of the cost efficiency and other benefits of one particular solution, involving a new drop-off structure has been made.

In the present study an object model of the newspaper home distribution has been developed, which is an extension of the existing IFRAtack production model. We have reasons to believe that IT-solutions based on a structured model can be used to achieve a better productivity within the newspaper distribution process.

1. Introduction

1.1 Background

The newspapers in the Nordic countries offer their readers a home delivered newspaper, often before 6 a.m. This helps the newspaper stay competitive as an information channel. But the distribution ser-

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vice is one of the most cost demanding processes of the newspaper companies, approximately 20% of the total cost [Nordqvist, 1996], which is one important purpose for the distribution to be improved.

In this study, the morning newspaper distribution companies do not track the transportation of bundles to the bundle drop-offs, where the carriers receive the newspapers. Moreover, they do not track the delivery from the drop-offs to the subscribers.

Hence, the distribution companies do not have the possibility to have full control of the distribution process. A better control would make it easier to optimize the distribution on a day-to-day or on a minute-to-minute basis. In order to track and analyze the distribution, technology such as the Internet, Global Positioning Systems (GPS), Supply Chain Management (SCM), Global System for Mobile communications (GSM) etc. are being used in several distribution businesses, such as Federal Express [Baston, 1999]. This technology would be possible to use in order to manage the newspaper distribution process.

In the last decade a model of the newspaper production has been designed and successfully applied—the IFRAtrack recommendations. IFRAtrack covers the pre-press, press, mailroom and some distribution activities [Fällström, 1997], [Stenberg, 1997], [Nordqvist, 1996]. However, the whole distribution process has not been modeled in IFRAtrack.

In this paper a study has been conducted to identify the distribution process activities and their relationships. Furthermore, an extended IFRAtrack model is presented.

1.2 Objectives

By expanding the IFRAtrack model to include the distribution process and using this as the basis for a distribution management system, a better distribution control could be achieved. The objectives of this study are to identify the relationships between the most essential operations within the newspaper distribution process for morning newspapers and to identify relevant data shared between the operations.

1.3 Limitations

Only the home distribution, of three Swedish morning newspapers, was taken into consideration. In Sweden approximately 92% of the total circulation is subscribed [TU, 1999]. The planning operations for the distribution and the execution of the distribution were studied. This study is representative of the Nordic model of newspaper distribution, but might also be applicable to other kinds of distribution.

2. Method

2.1 Introduction

The morning newspaper distribution is a complex process involving several activities. In this study our analysis focuses on the operations involved in the distribution planning and delivering, and how they interact. It also included the operations carried out during the delivering process in order to find which of them that are important to track and receive status information from.

The distribution of home delivered newspapers at three different newspaper distribution companies has been analyzed. These three companies have a home delivered distribution, which have to be completed before 6 a.m. on weekdays and 7 a.m. on weekends. Most of the subscribers read the newspaper before 8 a.m. [TU, 1999], which makes the distribution process time dependent.

The companies for this study were chosen based on their distribution situation and their different number of distributed copies. The newspapers are distributed under severe time constraints and their different number of distributed copies each night, are approximately 25 000 to 400 000. The companies were analyzed between October and December in 1999. In January and February 2000, the findings were discussed with the companies.

In order to investigate the distribution process, we conducted literature research, qualitative research including interviews with staff and managers in the field of post-press and distribution and field studies at three newspaper distribution companies.

2.2 Literature study

The literature research involved academic papers, doctoral theses, trade-press articles and books related to the area of research.

2.3 Interviews and seminars

Interviews and open discussions were held with 10 staff and 15 managers from the operations within the distribution companies to establish how the operations interact. Their working routines were discussed openly. Two seminars were held and attended by executive managers of post-press and distribution departments, which covered issues regarding the demands to improve the distribution process.

2.4 Field studies

The field studies were conducted in two steps at all companies. The first step was carried out during three days and two nights and included studies of the physical flow of the newspaper product and observations of the staffs' working routines. The second phase was also carried out during three days and two nights. However, the objective of the second phase was to determine which information the staff needed in order to accomplish their tasks as well as how the different operations interacted with each other to provide and receive the relevant information.

3. The Nordic newspaper distribution process

In Sweden, as typically in all Nordic countries, the distribution of morning newspapers is executed by distribution companies. These distribution companies can either be owned by, or independent of the newspaper producers. Hereafter, all types of owned distribution companies are referred to as distribution companies. The distribution companies have the responsibility for the distribution of newspapers in specific geographic areas. The distribution companies normally have to distribute all morning newspapers, which have subscribers in their specific geographic area.

Externally produced newspapers have to be transported to the distribution centers by each morning newspaper company. Then, when the newspapers have been transported to the distribution center, the distribution companies are responsible for delivering the newspapers to the subscribers.

In order to handle the distribution of the newspapers printed at the print house, hereafter called internally produced newspapers, and the externally produced newspapers, the distribution companies need a day organization and a night organization. The day organization, which normally consists of five operations, is responsible for production and distribution planning, which answers the questions What?, How?, By whom? and When? [Enlund, 1998]. The questions asked could be; What newspapers need to be distributed?, How will the newspapers be distributed?, Who will distribute the newspapers? and when will the newspapers be distributed? But they also assist the carriers and provide services for the subscribers. The operations involved in the day organization are transportation management, circulation updating, carrier management, distribution center management and customer service. The night organization is responsible for the execution of the production and the distribution. These operations are carried out in the mailroom, at the distribution center, at the loading dock, at the operation center, by the vans and by the carriers.

The day organization provides parts of product data, process data and resource data for the night organization. The product data describes the products to be delivered. Such data involves information about the circulation, the readers and the products, and it may be used to estimate production time, generate bundles and to execute the distribution. The process data describes the sequence of activities in the process flow. The process flow consists of pre-press, press, post-press and distribution operations and the process data provides information about the reliability of the production run, how different editions, edition versions and products are produced, but also how transports and carriers are organized. The resource data describes the resources to be used in each activity in order to manage the production and distribution process [Enlund, 1998]. The resource data provides, for instance, information concerning the number of trucks and carriers available and their capacity.

4. Distribution planning

4.1 Introduction

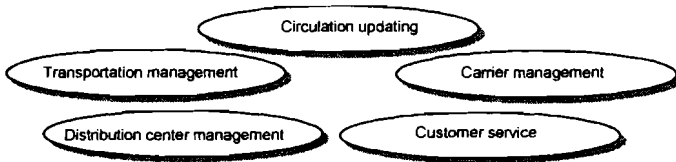


Figure 1: The five operations in the day organization, which plans the production and the distribution, assists the personnel involved in the distribution and provides services for the customers.

Figure 1 shows the five operations that plan the production and distribution, assist the personnel involved in the distribution and provide services for the customers. The night organization depends on these five operations and they have to be completed before the distribution starts.

4.2 Transportation management

The transportation management is responsible for allocating resources, vans, to the transportation routes and to schedule these transportation resources to minimize time, costs and delays between dispatching and delivery [Malmborg, 1995]. These vans are needed for the routes for transporting bundles to the drop-offs, where the carriers

continue the newspaper distribution. The vans have to be planned according to the number of copies they must load and transport to the drop-offs.

The vans for the routes have timetables for loading, which are set according to how the routes are planned geographically. The further away a van has to transport the newspaper bundles, the earlier they have to arrive at the loading dock for loading of newspaper bundles, in order to depart from the loading dock at a specific time. The departure time is determined, by the time the vans have to arrive at the drop-offs within their routes.

4.3 Circulation updating

The circulation updating is the newspapers' interface with the customers, regarding the subscription transactions. These transactions consist of take out or cancel subscriptions or suspending subscriptions for a period of time. They also include of changing subscription addresses, either temporarily or permanently. Some newspaper companies also offer the service of storing the newspapers for the customers.

The subscription information consists of the number of subscriptions and each subscriber's address, which are important for the printing production, the mailroom production and the carriers. The printing production staff will need this information in order to be able to print the correct number of copies for each edition. The mailroom will need it to produce the correct number of bundles, with the correct number of copies in the correct order. The carriers need to know which subscribers there are in their carrier districts. The daily changes, i.e. the new subscribers for the next day and those who have cancelled their subscriptions, are shown on the bundle top-sheet. This is placed on the newspaper bundle assembled by the distribution center.

4.4 Carrier management

The carrier management is in charge of assisting the carriers and making sure there will be carriers for every carrier district. They also make sure to appoint stand-in carriers on those carrier districts, which do not have an ordinary carrier. These stand-in carriers need to receive keys, key codes and carrier district information, in order to be able to deliver newspapers. The district information consists of the subscribers' names, the newspaper(s) they have subscribed to, street addresses and sometimes the floor and apartment number. This information is delivered to the distribution center and then distributed to the drop-offs by the vans, where the carriers receive it. Sometimes the stand-in carriers pick up the carrier district information at the distribution company.

The operation center will be notified about the carrier districts which have not been provided with stand-in carriers. The center will then be responsible for appointing on-call carriers for these districts.

4.5 Distribution center management

In order to distribute externally produced newspapers the distribution center management receives orders from newspaper companies which have subscribers in that specific geographic area. These orders include information regarding the subscribers, which includes their name, address and the newspaper. This information is forwarded to the distribution center, which then package the externally produced newspapers for the carrier districts.

4.6 Customer service

The customer service assists the subscribers when they have not received a newspaper, the newspaper was delivered late or the newspaper did not have the expected quality. The customer service receives appropriate information from the operation center to be able to inform the subscribers.

When a "new" newspaper has to be delivered the distribution company either use their own carriers or another distribution company. Thereby, the customer service must inform their carriers or the other distribution company. Lastly, the customer service will file the complaints from the subscribers and thereafter, inform the carriers of complaints from subscribers on their carrier districts.

The service to the customers regarding information of late deliveries could be improved if the customer service would receive information earlier from the operation center and the carriers. This information has to be received by the customer service when they open in the morning.

5. Distribution operations

5.1 Introduction

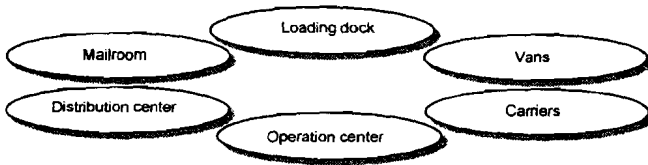


Figure 2: The night organization is responsible for the activities in order to handle the distribution of newspapers. These activities are carried out in the mailroom, at the distribution center, at the loading dock, at the operation center, by the vans and by the carriers.

The night organization is responsible for the execution of the production of newspaper bundles and the distribution. These operations are carried out in the mailroom, at the distribution center, at the loading dock, at the operation center, by the vans and by the carriers. In order to perform these operations the staff involved in each operation receive information from the operations within the day organization.

5.2 Mailroom

The mailroom operation is in charge of bundling the internally produced newspapers. These bundles are produced in the stackers, which count the number of copies each bundle will contain. The stackers must receive information regarding the order in which the bundles need to be produced, depending on the number of copies each bundle will contain and the loading scheme for the vans.

When the newspaper bundles have been produced in the stackers they have to be addressed. This address is used for loading the correct newspaper bundle to the correct van and delivering it to the correct drop-off and carrier district. A top-sheet including distribution information is placed on the bundles either manually or on-line with the use of a printer.

5.3 Distribution center

The distribution center is in charge of packaging externally produced newspapers for each route and carrier district. In order to package they must receive information on which newspapers each van must transport and each carrier must deliver. This information is received from the distribution center management.

The externally produced newspapers, packaged at the distribution center, are usually loaded before the vans will load the internally produced newspapers. Therefore, the distribution center must receive the externally produced newspapers in time to package them before the vans arrive at the loading dock. Depending on how much the distribution center have to package, the transports of the externally produced newspapers have different arrival times at the distribution center.

Sometimes the externally produced newspapers are already packaged for different drop-offs. In this case the carriers themselves, at the drop-offs, pick out the number of copies they need for their district.

5.4 Operation center

Apart from providing the carrier districts, using stand-in or on-call carriers, the operation center also assists and informs the carriers, e.g. expected arrival times for the vans at the drop-offs and the van drivers receive assistance when problems occur.

A computer system for providing information to and receiving from the van drivers and the carriers would improve the work at the operation center. Problems can be solved faster when the flow of information is real time.

5.5 Loading dock

Internally produced newspaper bundles are loaded on the vans at the loading dock. To ensure a steady flow through the dispatching area, the vans should arrive at the loading dock slightly after the internally produced newspapers have been bundled. However, the bundles can be stored temporarily at the loading dock, so the bundling and loading need not be synchronized. On the other hand, in order to arrive at the drop-offs on time, the vans have to depart from the loading dock at a certain time.

5.6 Vans

When the vans have loaded the internally and externally produced newspapers they start their routes. The vans' departure times from the loading dock are reported by the operation center or by the drivers themselves. However, the arrival times at the drop-offs are only reported if the vans are late. This report is usually handed in to the operation center, which then report the late arrivals to the customer service.

The vans follow a predetermined transportation route dropping off bundles at drop-offs for the carriers. There, the carriers pick up the bundles addressed to their carrier districts.

5.7 Carriers

The carriers must arrive at the drop-off at a predetermined time, which is set in relation to the time it takes to deliver the whole district and at what time the district must be completed. The time it takes to deliver newspapers on the whole district can be partly predicted by household coverage and type of buildings.

The carriers are in charge of delivering the newspapers from the drop-offs but sometimes also directly from the loading dock. The carriers' districts are set according to, among other factors, how many subscribers they have to deliver to. Depending on which kind of vehicle they use, their districts also differ in size and number of copies. The carriers either walk, use a bicycle or a car for delivering newspapers.

In order to know where to deliver the newspapers, the carriers use carrier district information. Some carriers have this information written in a small book updated manually every night, while others receive a computer printout every night. Still, all carriers receive daily changes regarding subscriptions on the topsheet of the newspaper bundle.

Information on when the carriers have completed their districts is not regularly sent to the operation center. However, if the carriers are late or do not have enough newspapers to deliver to all subscribers, they call the operation center.

The carrier district information and the daily changes should be sent digital to the carriers, which would improve the information flow and the changes could be planned at an earlier stage.

6. IFRAtrack and production management

6.1 IFRAtrack for newspaper distribution

In the last decade the newspaper companies have invested in computerized pre-press departments and highly automated printing presses and mailrooms. In order to manage the newspaper production the IFRAtrack Working Group 2.0 was formed in 1997 to continue the IFRAtrack work conducted by the first working group in the mid 1990's. IFRAtrack is a recommendation for enabling information exchange systems within newspaper production. The primary objective

of the IFRAtack specification is to "...define a way of exchanging status and management information between local and global systems." [Fällström, 1997].

It is likely that many companies will invest in different technical tools and systems to be used within the newspaper distribution process. However, when these tools and systems are used in the distribution process a need for system integration will be increased. In order to adapt the distribution process all the way to the subscriber, the IFRAtack recommendation needs to be extended. The IFRAtack Working Group 2.0 has taken the newspaper distribution into consideration in the current model. However, much research remains if the model will support the newspaper distribution on a more detailed level.

In the remainder of this paper we discuss how the IFRAtack model could be further developed for the distribution process. Our objective is to model the newspaper distribution process in order to make it possible to track and follow up the distribution in real time. The information should also be usable when planning the newspaper distribution and the model must also fit into the existing IFRAtack model. We have chosen to present two models where the detailed model should be used for planning and the other model is sufficient for tracking purposes.

6.2 A data model of newspaper distribution

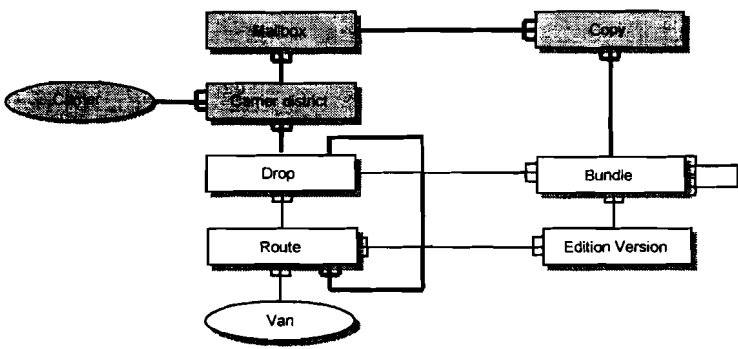


Figure 3: The suggested extension of the IFRAtack model of newspaper distribution process. Grey object and resource classes are added to the existing IFRAtack model. New links added to the existing model have bolder lines.

As seen in figure 3, the extended IFRAtrack model of the distribution process consists of seven object classes and two resource classes. The object classes are route, drop, edition version, bundle, carrier district and mailbox. These object classes have a certain structure; therefore, some are linked to others. The link relationship can for instance be one-to-one, one-to-one or many, one or many-to-one or many-to-many. All object classes have attributes and activities and the resource classes only have attributes, which are important tracking information and therefore need to be communicated. These attributes have to be defined for each object and resource class.

6.2.1 Resource classes

There are two types of resource classes in this model, van and carrier. The van describes the load of a distribution vehicle [Fällström, 1997] and the carrier is the resource delivering copies to one or several addresses at one or several carrier districts.

6.2.2 The object classes

The seven object classes have a certain structure, which means that some object classes will be linked to others. The object class edition version is a specific edition of the newspaper with one or more specific inserts [Fällström, 1997]. One bundle contains one or several copies of one edition version. Each bundle can also consist of one or several bundles. The object class route is an ordered set of pick-up and delivery points for bundles containing one or several edition versions. The object class drop is a point for picking up or delivering bundles of a specific edition version. Hence, a drop on one route can be a pick-up on another route. In this model the loading dock can be considered a drop exclusively for picking up bundles. A carrier district is an object class, which is an ordered set of points where copies are picked up at drops and delivered at mailboxes. One or several mailboxes exist on one carrier district.

6.2.3 The relationship between the resource and object classes

A van transports and delivers bundles to one or many drops at one or many routes. Then, either a carrier or a van picks up bundles at a drop. The carrier delivers copies of an edition version to one or many mailboxes within a carrier district while a van can pick up bundles at the drop and then continue another route to one or several drops.

6.3 The further developed IFRAtrack model for newspaper distribution

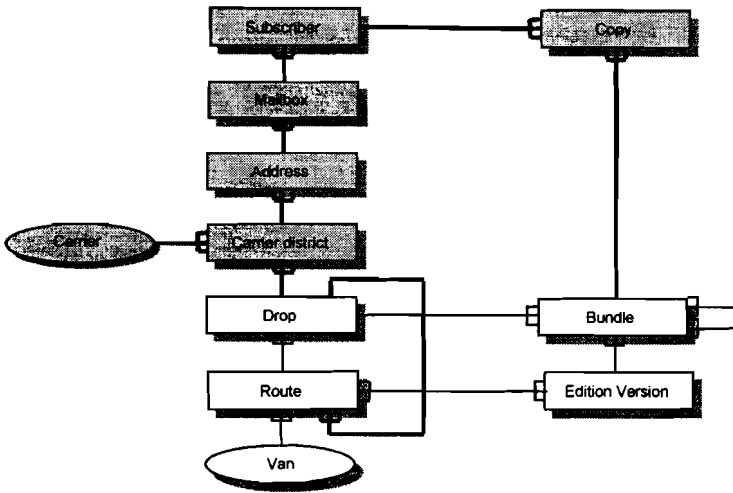


Figure 4: The IFRAtrack object and resource classes in the newspaper distribution. Grey object and resource classes are added to the existing IFRAtrack model. New links have bolder lines.

In this model, which is further developed, figure 4, two additional object classes are included. These object classes are address and subscriber. The object class address is an ordered set of delivery points, which consists of one or several mailboxes. The object class mailbox is an ordered set of delivery points, which consist of one or several subscribers. The object class subscriber is an ordered set of delivery points for one or several copies. It is valuable for the planning of carrier districts to add the object class address, which consist of one or several mailboxes.

6.3.1 The relationship of the resource and object classes

When a carrier deliver a copy to one or several addresses, these addresses can contain one or several mailboxes. Every mailbox consists of one or several subscribers, which receive one or several copies.

The models, in figure 3 and 4, are suppose to be scaleable, because sometimes it is not possible to track a certain object class due to technical aspects. Therefore, the object classes, which are linked to the object class that will be removed, have to be linked to each other. However, the relationships between them may have to be redefined.

7. Discussion and conclusions

The newspaper distribution process is a very complex and time critical operation and large circulation changes are not uncommon. With flexible scheduling methods and the ability of real time coordination/rescheduling between production and distribution in newspaper operations, it will be possible to change the distribution operation on a day-to-day or minute-to-minute basis.

A structured model of the distribution process will form a basis for computer based distribution logistic systems. If the distribution systems are used in combination with modern tools for data capture and data communication it is likely these tools will lead to increased quality and reduced lead times and resource consumption in the distribution process.

In the last decade the newspaper production has been subject to extensive research. This has led to several improvements in tracking and following up the production process. An IFRAtrack model has been developed and designed to track and follow up the newspaper production operations [Fällström, 1997]. However, the newspaper distribution process still lacks the possibilities to be tracked and followed up in a standardized way. In this paper an extension of the present version of the IFRAtrack model of the distribution process has been suggested.

The IFRAtrack model of the distribution process shows how the process can be executed and what object classes that should be tracked and followed up. During recent years new wireless technologies can be used in order to track the distribution process. Cellular telephones, GPS-devices and other devices for wireless communication means new possibilities for efficient information management. However, further research must be done in order to know which of the technical devices that are most suitable for distribution management purposes. If a management system that use the IFRAtrack recommendation should be designed for the distribution purpose, it could extend the existing systems that use the IFRAtrack standard.

By using a management system for real time tracking the distribution companies would be able to deal with problems when they occur and to plan the distribution process on a day-to-day or minute-to-minute basis.

The newspapers will gain a lot, if a more process-oriented and standardized approach will be used with respect to the distribution operation. The present version of the IFRAtrack-recommendation (version 2.0) needs to be extended with carrier district, carrier and address

objects and associated attributes. An extension of the IFRAtrack model will make it possible to manage the delivery operation all the way to the customer.

Besides the new objects some minor adjustments are suggested to the IFRAtrack model. In order to support re-loading of bundles during transportation operation, the drop object is related to one or many routes and the route object is related to one or many drops.

Modern information technology will also make it possible to further parallel the production and distribution and reduce the slack without losing control. By changing the drop-off structure; hence, using more drop-offs, the carriers would be able to manage larger districts. Since, the newspaper copies are getting heavier the carriers have problems with carrying the newspaper bundles. With a different drop-off structure the carriers could carry a smaller amount of newspapers in the beginning of their carrier districts. In addition to the improved working environment for the carriers, it also has the result that fewer carriers are needed due to larger districts. However, the printing production must be changed and more transportation kilometers are needed. How this affects the total production and distribution process must be the object of further research.

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