Roosevelt University

Cost and Processing Analysis for Retailers

A Thesis Submitted to
the Faculty of the College of Arts and Sciences
in Candidacy for the
Degree of Master of Science
in Computer Science and Telecommunications

by

Vincent D. Wiggins

Chicago, Illinois
August 2003
Dedication

I dedicate this graduate project to my family. Ancynthia Wiggins, my mother who taught me at a young age the importance of education. She also taught me to pursue my dreams and face my fears. The discipline was not only provided in our conversations, but by examples she provide in my daily life. Cynthia Crowe, my sister who opened my eyes to a world and culture that I would not have experienced without her guidance. She was my motivation to pursue my goals when it seemed that I was at a dead end. Cornel Wiggins, my brother taught me not to fear what I am unable to understand. Herbert Henderson, my lifelong friend who has taught me patience and provided ongoing support in completing this project.

I dedicate this Master of Science Degree in Computer Science and Telecommunication to each of you. Without your support, this dream would not have come true.
Acknowledgements

My thanks be to God, my protector and the source of all my gifts. Without him none of this would have been possible.

My gratitude to Professor Roger Clery in the Department of Computer Science and Telecommunications, who sponsored and supported this graduate project along with arranging his schedule to meet around my work schedule. The other professors in the Department of Computer Science and Telecommunication who guided me to completing my Master of Science in Computer Science and Telecommunications.

I would like to thank the retailers who provided the information for my project.

Finally, thanks to my friends, fellow students, and coworkers who provided words of encouragement, motivation, and inspiration in times of need during the completion of this project.
Cost and Processing Analysis for Retailers

by

Vincent Wiggins

Computer Science and Telecommunication

Committee Chairman: Professor Roger Clery
Abstract

This project involves the grocery food retailers’ Information Technology (IT) structure, physical structure, data transmission frequency, and data transmission options to third party vendors. It mainly focuses on the media and communication options that are available for a grocery food retailer to select in transmitting data. This document is structured in four major sections with several subsections:

Section 1 provides background information on the grocery food retailer Information Technology Environment.

Section 2 discusses the different retailer data transmission methods that are currently used. The main focus is on the grocery food retailer.

Section 3 discusses the retail Information Technology structure. The section is compiled of three subsections that define the retail size, data flow methods, and data flow frequency.

Section 4 revolves around the discussion of the competitive advantage for the various grocery food retailers based on the retailer’s environment.
Table of Contents: Cost and Processing Analysis for Retailers.

Title Page
Dedication..................................................................................................................ii
Acknowledgement.....................................................................................................iii
Abstract.....................................................................................................................v
Table of Contents.......................................................................................................vi
List of Figures.............................................................................................................vi

Section 1: Background Information: Retail Information Technology Environment........1
Section 2: Retailer Data Transmission Methods........................................................3
   A. Disk, Tape, and Cartridge..................................................................................3
   B. Telecommunication Analysis:
      a. FTP.............................................................................................................4
      b. EDT............................................................................................................13
      c. Internet........................................................................................................14

Section 3: Retail Information Technology Structure
   A. Retail Size:
      a. Large Chains..........................................................................................15
      b. Medium Chains......................................................................................17
      c. Small/Independent Chains.....................................................................17
   B. Data Flow:
      a. Multiple Data Warehouse........................................................................18
      b. Single Data Warehouse...........................................................................20
      c. No Data Warehouse.................................................................................21
   C. Data Flow Frequency:
      a. Trickle Feed.............................................................................................22
      b. Daily Feed...............................................................................................23
      c. Weekly Feed............................................................................................25

Section 4: Competitive Advantage...........................................................................25

I. References............................................................................................................27
II. Appendix A: Retailer Surveys.............................................................................28
III. Appendix B: Retailer Flowcharts.....................................................................35
List of Figures

TCP/IP Protocol Suites...............................................................Figure 1
Retailer Data Flow – FTP Method.............................................Figure 2
Multiple Data Warehouse..............................................................Figure 3
Single Data Warehouse.................................................................Figure 4
No Data Warehouse........................................................................Figure 5
Competitive Advantage Chart.........................................................Figure 6
Section 1

Background Information: Retail Information Technology

Environment

The financial resource for Information Technology Development is small for grocery food retailers. The grocery food retailer environment is a very small profit margin industry. In addition, it is directly related and vulnerable to consumer income. "Food retailing is a relatively slow-growth industry, typically expanding with increases in population, about 1 percent per year, on average. In the 1989-99 decade, real grocery store sales were relatively flat, averaging 0.2 percent annually." "The share of consumers' disposable income - income after taxes - spent on food sold in retail stores (food at home) has fallen from 7.1 to 6.3 percent over this same period" (Structural Change in the U.S. Food Industry, p. 31).

In addition to the small profit margin, retailers are constantly "consolidating to ensure their long-term success in response to competitive forces. Food retailers also site greater efficiencies in the procurement of retail products as a benefit of consolidation. Food retailers hope to lower per unit cost of goods by negotiating with suppliers and distributors for lower wholesale prices on large orders" (Structural Change in the U.S. Food Industry, p. 33).

The retailer is also experiencing an industry change in Information Technology structure. "To lower operating costs, consolidating grocery retailers are centralizing management and control at headquarters" (Structural Change in the U.S. Food Industry, p. 33).
The grocery food retail industry is experiencing an increase in competition by other outlets entering the market.

“Structural Change in the U.S. Food Industry” found the following:

The growth of discount mass-merchandisers and warehouse club stores has likely provided additional sources of competition for food retailers. Mass-merchandisers, such as Wal-Mart, Kmart, and Target, and warehouse club operators, such as Costco, Sam’s (a division of Wal-Mart), and BJ’s, have increased their share of retail food sales from 2.8 percent in 1988 to 8.1 percent in 1998. In contrast supermarkets’ share of food sales fell from 65.8 percent in 1988 to 60.3 percent in 1998. Convenience stores, other grocery stores, specialized food stores, and other retail stores accounted for the remaining sales shares (Structural Change in the U.S. Food Industry, p. 34).

These factors have led to the diversification in the Information Technology structure for the grocery food retail industry.
Section 2

Retailer Data Transmission Methods

2.A - Disk, Tape, and Cartridge

The disk, tape, and cartridge data transmission methods are the oldest used by grocery food retailers today. These data transmission methods are in use by chains with the following characteristics:

- Information Technology departments structured in the 1980’s or earlier.
- Small Information Technology departments that require minimum data manipulation.

The disk data transmission method is used by retailers who have computers that have a DOS, Unix, or Windows(95, NT, 2000, or etc.) operating system. The Tape and Cartridge data transmission method is provided by retailers who operate in a mainframe environment.

The cost for disk, tape, and cartridge is more expensive than other data transmission methods. The cost for disk, tape, and cartridge data transmission is based on the following:

1. Point of origination and destination
2. Number of media types: disks, tapes, or cartridges
3. Expected delivery time. The cost significantly increases for time sensitive data transmission/delivery.
One of the major concerns in using disk, tape, and cartridge as a data transmission method is unreliability. These media are copied from the source’s system onto media and delivered to the final destination by courier. The successful delivery of data on these media types is often delayed due to corrupt media, lost media, or incorrect routing path due to human error.

The advantages to disk, tape, and cartridge methods are:

- They do not require communication set up.
- They provide a standard method for smaller grocery food retailer’s Point of Sale computer environments.

The disadvantages to disk, tape, and cartridge methods are:

- Unreliable media delivery.
- High risk of data corruption.

2.B - Telecommunication Analysis

FTP (File Transfer Protocol)

TCP/IP is the most widely used interoperable architecture for Internet communication standards. “TCP/IP is a result of protocol research and development conducted on the experimental packet-switched network, ARPANET, funded by the Defense Advanced Research Projects Agency (DARPA), and is generally referred to as the TCP/IP protocol.
suite. In the 1990’s, TCP/IP has become firmly established as the dominant commercial architecture and as the protocol suite upon which the bulk of new protocol development is to be done” (Stallings, 1997, pp. 520).

TCP/IP was successful for several reasons. The success further allowed for the preference of TCP/IP protocol over Open Systems Interconnection (OSI):

1. TCP/IP protocols were specified, and enjoyed extensive use, prior to ISO standardization of alternative protocols. Thus, organizations in the 1980s with an immediate need were faced with the choice of waiting for the always-promised, never-delivered complete OSI package, and the up-and-running, plug-and-play TCP/IP suite. Once the obvious choice of TCP/IP was made, the cost and technical risks of migrating from an installed base inhibited OSI acceptance.

2. The TCP/IP protocols were initially developed as a U.S. military research effort funded by the Department of Defense (DOD). Although DOD, like the rest of the U.S. government, was committed to international standards, DOD had immediate operational needs that could not be met during the 1980s and early 1990s by off-the-shelf OSI-based products. Accordingly, DOD mandated the use of TCP/IP protocols for virtually all software purchases. Because DOD is the largest consumer of software products in the world this policy created an enormous market encouraging vendors to develop TCP/IP based products.

3. The Internet is built on the foundation of the TCP/IP suite. The dramatic growth of the Internet, and especially the World Wide Web, has cemented the victory of TCP/IP over OSI (Stallings, 1997, pp. 520-521).
There is not an official model for the TCP/IP protocol. However, the protocol suite is usually characterize by the following five layers:

**Application layer.** Provides communication between processes or applications on separate hosts.

**Host-to-host, or transport layer.** Provides end-to-end, data-transfer service. This layer may include reliability mechanisms. It hides the details of the underlying network or networks from the application layer.

**Internet layer.** Concerned with routing data from source to destination host through one or more networks connected by routers.

**Network access layer.** Concerned with the logical interface between an end system and a sub network.

**Physical layer.** Defines characteristics of the transmission medium, signaling rate, and signal-encoding scheme.

(Stallings, 1997, p. 522)
Figure 1

Some protocols in the TCP/IP protocol suites

There are several protocols in the TCP/IP protocol suite. Some examples are listed below:

BGP = Border Gateway Protocol

FTP = File Transfer Protocol

HTTP = Hypertext Transfer Protocol

ICMP = Internet Control Message Protocol

IP = Internet Protocol

OSPF = Open Shortest Path First

MIME = Multi-Purpose Internet Mail Extension

SMTP = Simple Mail Transfer Protocol
SNMP = Simple Network Management Protocol
TCP = Transmission Control Protocol
UDP = User Datagram Protocol

(Stallings, 1997, pp. 522)

In addition, Figure 1 demonstrates the relationships between the protocols as shown by the lines.

As previously stated, the TCP/IP growth was due to its wide acceptance. "Initially TCP/IP was used mostly between minicomputers or mainframes. These machines had their own disks, and generally were self-contained. Thus the most important "traditional" TCP/IP services are: - file transfer. The file transfer protocol (FTP) allows a user on any computer to get files from another computer, or to send files to another computer"(www.FTP.com).

FTP is the acronym for File Transfer Protocol. It is one of the simplest and most secure ways to exchange files over the Internet. FTP is a simple way to set up communication for retailers with a full-time Internet connection available. The communication setup uses script and batch files to transmit data. FTP is convenient in that it allows data that originates by modem, satellite, and other communication mediums to use the Internet to communicate to other communication mediums. The diagram below (Fig. 2) provides an example of how using the FTP communication allows a third party vendor to receive data that originated from a modem, satellite, and cellular tower. In addition, the file can originate from different operating systems. For example, DOS, UNIX, WindowsNT, etc.
Figure 2
Retailer Data Flow using FTP Method

The requirements for an FTP set up are simple when you consider the following. "When downloading a file from the Internet using FTP you're actually transferring the file to your computer from another computer over the Internet" (www.FTP.com).

The requirements are the following:

- Internet access.
- User’s account established on the third party’s FTP server.
- If applicable, update any databases for automation of communication session.
Internet Society Website states the following:

To make an FTP connection you can use a standard Web browser (Internet Explorer, Netscape, etc.) or a dedicated FTP software program referred to as an FTP 'Client'.
When using a Web browser for an FTP connection, FTP uploads are difficult, or sometimes impossible, and downloads are not protected (not recommended for uploading or downloading large files).
(www.internetsociety.org)

When connecting with an FTP Client, uploads and downloads couldn't be easier, and you have added security and additional features. For one, you're able to resume a download that did not successfully finish, which is a very nice feature for people using dial-up connections who frequently lose their Internet connection.

FTP connections are secure connections as part of the communication set up process.

The Internet Society on the FTPPlanet Website states the following:

Authorization is the process of validating a user for login. The basic authorization process involves the USER, PASS, and ACCT commands. With the FTP security extensions, authentication established using a security mechanism might also be used to make the authorization decision.
(www.ftpplanet.com)

Without the security extensions, authentication of the client, as this term is usually understood, never happens. FTP authorization is accomplished with a password, passed on the network in the clear as the argument to the PASS command. The possessor of this password assume to be authorized to transfer files as the user named in the USER command, but the identity of the client is never securely established.
An FTP security interaction begins with a client telling the server what security mechanism it wants to use with the AUTH command. The server will either accept this mechanism, reject this mechanism, or, in the case of a server which does not implement the security extensions, reject the command completely. The client may try multiple security mechanisms until it requests one which the server accepts. This allows a rudimentary form of negotiation to take place. (If more complex negotiation is desired, this may be implemented as a security mechanism.) The server's reply will indicate if the client must respond with additional data for the security mechanism to interpret.

(www.ftpplanet.com)

FTP is the best option for users who are looking for an inexpensive secure controlled environment.

FTPPlanet Website supports this theory in the following statement:

Running an FTP server on your computer can virtually guarantee that your friends, co-workers, and vendors can get all your files in a timely, secure manner. Running an FTP server is safe. FTP servers allow you full control over who can login to your computer, which files they can access, and whether or not they’re able to upload.

To run your own FTP server all you need is a computer with an Internet connection (any Internet connection will do) and FTP server software.

Now there are numerous of options when choosing FTP server software. Like all Internet software, FTP server software is available at all price ranges. The server that is best for you depends on how often you intend on running your FTP server, how many people you expect to access your FTP server and the amount of money you’re willing to spend.

(www.ftpplanet.com)

The advantages for the FTP method are:

- Easy setup.
- Low Cost.
- Quick Implementation.
- Industry Protocol.

The disadvantages for the FTP method are:

- Internet is unpredictable.
• File size limitations.
• File transfer time limits.

TCP/IP is a success due to many contributing factors, some are:

1. Received favorably by users.

2. TCP/IP flourished and the Internet evolved quickly because of the work performed under the umbrella of the Internet Engineering Task Force (IETF).

3. IETF committees also often provide free software implementations of new protocols. Quick development, testing and rollout are characteristic of Internet protocols.

4. This protocol suite consists of a large collection of protocols that have been issued as Internet standards by the Internet Activities Board (IAB)

**Telecommunication Analysis – EDT**

EDT is the acronym for Electronic Data Transfer. EDT allows for a clear communication path ownership over the grocery food retailer owned frame circuit.

In addition, there is automatic recover from circuit drops and automatic file compression for data transfers. EDT is one of the most secure methods for a grocery food retailer to transfer data. However, it is one of the most expensive electronic data transmission set ups that is currently available to grocery food retailers.

According to the MIT.edu Website article, Administrative Computing Principle for MIT – Principle 9: Electronic Data Transfer:
Costs of the technology for electronic data transfer are going down, while costs of people are increasing. The time people spend transcribing data (copying from one form, often a computer-generated report, to another, perhaps a workstation) could be better spent on other tasks. The possibility for error increases each time data must be copied. The further away from the point of origin, who might be a requisitioner wielding a pencil, that data are captured electronically, the more likely are data errors. Time spent reconciling discrepancies could be used more productively.
(www.mit.edu)

The requirements that are involved in EDT set up are: hardware, software, custom scripts, mini hubs, network cables, EDT script maintenance/upgrades, on call support and ongoing monitoring.

The advantages to the EDT method are:

- Communication over retailer owned frame circuit.
- Auto recovery from circuit drops.
- Secure limited access to EDT server from pre-defined source IP.
- File Compression.

The disadvantages to the EDT method are:

- Non-industry standard requires additional development and documentation.
- EDT Scripts are required to automate data transmission.

**Telecommunication Analysis – Internet (Email)**

Email is an abbreviated term for Electronic Mail. Email is a process that uses the Internet. It is the simplest way to exchange files over the Internet. “Like a conventional postal system, an Email system is responsible for collecting and distributing correspondence of various sizes and types and routing that data to its recipients in a timely manner” (Stamper, 1994, pp. 152). However, it is one of the least secured methods for transmitting data.
The advantages to the Email data transmission method are:

- Easy set up.
- Uses standard protocol.
- Broadcast messages and message attachments to all users.
- Notification of failure to deliver a message.
- Carbon copying.
- Message prioritizing.
- Predefined distribution list.

The disadvantages to the Email data transmission method are:

- File Size Limitation.
- Data transmission difficult to automate.
- Internet is unpredictable.

(Stamper, 1994, pp. 153-154)
Section 3

Retail Information Technology Structure

3.A - Retail Size

There are three major categories of grocery food retailer chains. The categories are small/independent chains, medium chains, and large chains.

Large Chains

This section will define large grocery food retailer chains. These are retailers that have over a thousand stores, over ten billion dollars in sales, or a combination of over a thousand stores and over ten billion dollars in sales. The sales include sales by U.S. grocery stores only, and exclude sales by other business units, foreign sales, franchised sales, and drugstores.

Three of the top 5 large chains are a result of mergers.

“Structural Change in the U.S. Food Industry” found the following:

Two blockbuster mergers were announced in 1998 involving the largest-ever combined sales by food retailers. Kroger, already the largest grocery retailer in the United States with 1997 sales of $26 billion, merged with Fred Meyer to form a multiregional supermarket operator with $45.3 billion in combined sales in 1999. The merger resulted in the combined sales accounting for an estimated 10.4 percent of total grocery store sales, which reached $434.7 billion in 1999....

Also in 1998, the fourth-largest U.S. food retailer, Albertson, initiated its merger with second-ranked American Stores – operator of Lucky Stores, Jewel, and Acme Markets – resulting in combined sales of $28.9 billion, operating 1,690 supermarkets in 38 stores.

(Structural Change in the U.S. Food Industry, pp. 34)

The Information Technology departments in the large chains are more advanced in technology and lead the industry in technology development. The large chain Information Technology departments have the most challenges compared to the other grocery food
retailers chain categories. As stated earlier, the banners in the large chain are located throughout the United States. This type of environment requires the Information Technology department to remotely support and monitor operations. In addition, the Information Technology department is required to react in a timely manner to prevent significant data and profit loss.

"Structural Change in the U.S. Food Industry" found the following:

New information technologies, such as company wide satellite and Internet communications and store checkout scanner data, allow for centralization of many management activities that previously were the responsibility of store-level managers. The availability of timely and detailed information at headquarters also allows for effective control of operations over relatively large geographic areas. (Structural Change in the U.S. Food Industry, pp. 34)
Medium Chains

The next category of grocery food retailer chains is the medium chains. These chains are retailers with greater than ten stores and less than a thousand stores. In addition the sales are greater than one million dollars and less than ten billion dollars. The majority of stores in this category is made up of retailers who have not consolidated.

The medium chain retailers are usually concentrated in a limited region unlike the large chain banners that are located throughout the United States and possibly other countries. For example, three chains that are listed as medium chains are: Hy-Vee Food Store, Inc., Raley’s, and Wegman’s Food Markets. Hy-Vee Food Store, Inc is concentrated in the mid-west region (Illinois, Kansas, Minnesota, Missouri, Nebraska, and South Dakota). Raley’s is concentrated on the west coast (California, Nevada, and New Mexico). Wegman’s Food Markets is concentrated on the east coast (New Jersey, New York, and Pennsylvania).

The Information Technology departments in the medium chains are not as advanced in technology as the large chains, but are further developed than small and independent retailers. The technology developments in medium chains do not require national support, but regional Information Technology support and monitoring. In addition, the medium chains usually have a corporate office that has an Information Technology department. The Information Technology department either remotely supports the stores or makes onsite visits.

Small and Independent Chains

The next category of grocery food retailer chains is the small and independent chains. These chains are retailers with less than ten. Individual owners instead of a corporate
structure make up the majority of this category of retailers who have not consolidated, possibly specialty stores.

The small and independent chain retailers are usually concentrated in an even more limited region than the medium and large chain banners. The small and independent chain retailers are usually located within a one or two city limit. The close locality of the stores and minimum need for constant data feed does not require advance development of a large Information Technology department. In addition, financial resources are limited for support of the development of an Information Technology department.

There is usually not an Information Technology department in a small and independent chains structure as a result of:

- Limited financial resources
- Limited regional coverage
- Minimum data manipulation
- Minimum remote support and monitoring required.

Instead, there are a small number of employees who support the stores’ systems or the job is outsourced to a Service Company.

3.B - Data Flow

Currently there are three major data flows that occur in the grocery food retailer chains:

- Multiple Data Warehouse
- Single Data Warehouse
- No Data Warehouse (direct communication from the store)
Multiple Data Warehouse

Figure 3
Multiple Data Warehouse Dataflow

Figure 3 represents the Multiple Data Warehouse. Multiple Data Warehouses are appropriate in large chains. Multiple Data Warehouse is best in two situations. The first situation is the result of retailers merging. As the large grocery food retailer chains acquire additional banners, the large chain also inherits the additional banners Information Technology department. The new banners Information Technology departments usually have a different data flow process than the banner that acquires the new banner. Restructuring a banner data flow is expensive and requires a lengthy transition time. The delay usually results in a temporary set up of multiple data warehouse until the new banners data flow is merged into the purchasing corporate warehouse.
The second situation that results in Multiple Data Warehouse is the result of the Information Technology department data warehousing structure. Some organizations’ structures require them to have Multiple Data Warehouse. This decision is based on the following:

- Frequency of data feed
- Data manipulation
- User Departments Location

**Single Data Warehouse**

![Single Data Warehouse Diagram]

Figure 4

Single Warehouse Dataflow

Figure 4 represents the Single Data Warehouse. Single Data Warehouses are appropriate in the medium and large chains. The Single Data Warehouse is another option for large chains that require centralization of data manipulation, support and ongoing monitoring in one location. This process is more efficient in system upgrades since it requires updating one location. In addition, there is less risk of deviating from the standard operation process since there is one location supporting all stores instead of several Data Warehouses supporting multiple stores in different regions. The Single Data Warehouse does not require as many check and balances such as time stamps,
implementation date, back out process, and Standard Operation Procedures since there is a Single Data Warehouse and not Multiple Data Warehouses.

The Single Data Warehouse is appropriate for the medium chains because of the regional concentration of its stores. Therefore it is not necessary to have Multiple Data Warehouse, but it does require centralization of data and Information Technology department since there are several stores that require support and ongoing monitoring.

No Data Warehouse

![Diagram](image)

Figure 5
No Data Warehouse Dataflow

Figure 5 represents the No Data Warehouse. No Data Warehouses are appropriate in the small and independent chains. The No Data Warehouse is a result of the need to support a small number of stores that are closely located. In this environment, the retailer is able to physically monitor the stores. If there is a need for remote monitoring or support, the small and independent chains usually purchase a commercial monitoring application from a local computer store. The retailer installs the software application on the back office system at the main store. The software installation allows the retailer to monitor and support the other stores. However, the software is limited in its functions compared to a Data Warehouse capability.
3.C - Data Flow Frequency

Grocery food retailer chains are finding the need to have access to consumer purchases at a more rapid rate. This requires enhancements in the retailers data feed to the corporate location and third party vendors. There are currently three major data feeds for grocery food retailer chains. They are listed below in order of time delivery from least to most efficient:

- Trickle Feed
- Daily Feed
- Weekly Feed

Trickle Feed

Trickle Feed is the method of receiving the data from the retailer’s store within fifteen minutes of the customer purchasing an item. The information is provided to the Corporate Office/Data Warehouse with minimum delay from original purchase time of a product. This type of data feed allows the corporate and retail store personnel to react quickly to the individual retailer’s stores inventory. In addition, it avoids overstocking. Some of the large chains have invested over $500 million to develop a system. The trickle feed allows corporate to understand the shopping pattern of the consumers for each individual retailers’ stores. Trickle Feed is a new concept that is used by large chains because of the cost and support required for this type of data feed.
Daily Feed

Daily Feed is the method of receiving the data from the retailer’s stores one day after the customer purchased an item. The information is usually provided to the Corporate Office/Data Warehouse as part of the retailer’s nightly store closing procedures.

By providing this information to the Corporate Office/Data Warehouse, the retailer’s reduce cost in inventory.

Structural Change in the U.S. Food Industry states the following:

Large retailers also cite potential cost savings through streamlining product distribution functions. Large grocery chains typically perform wholesaling activities such as purchasing goods from suppliers, arranging for shipment to distribution warehouses, and replenishing store-level inventory. Supply-chain management practices such as continuous inventory replenishment (a method by which more frequent deliveries by suppliers reduce storage and inventory costs of the retailer), the use of cross-docking facilities (where single-load truck shipments from suppliers are transferred directly to mixed-load trucks for shipment to stores, eliminating the need for warehousing), direct store delivery to supermarkets by suppliers, and selective use of specialized wholesalers can reduce the need for large retailer-operated distribution centers and their associated costs. (Structural Change in the U.S. Food Industry, pp. 34)

Medium chains mostly use Daily Feed. This data feed is a method that provides timely data without incurring a significant increase in cost for Information Technology development.

Weekly Feed

Weekly Feed is the method of receiving the data from the retailers’ stores one week after the customer purchased an item. The information is usually provided to the Corporate Office/Data Warehouse as part of the retailer’s weekly store closing procedures. This feed is the original method of providing data to the Corporate
Office/Data Warehouse. The Weekly Feed is most common as a result of accounting practices that were required for the grocery food retailer chains.

The Weekly Feed is not the best method to use for data monitoring to support reacting quickly to inventory level, but is sufficient for small and independent chains that do not heavily rely on the data to react to inventory demand.
## Section 4

### Table 1

**Competitive Advantage**

<table>
<thead>
<tr>
<th>Small/Independent Chains</th>
<th>No Data Warehouse</th>
<th>Single Data Warehouse</th>
<th>Multiple Data Warehouse</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Weekly Feed</td>
<td>Daily Feed</td>
<td>Trickle Feed</td>
</tr>
<tr>
<td>Disk, Tape, and Cartridge</td>
<td>E</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>FTP</td>
<td>H</td>
<td>E</td>
<td>N</td>
</tr>
<tr>
<td>EDT</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Internment</td>
<td>H</td>
<td>E</td>
<td>E</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Medium Chains</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Data Warehouse</td>
</tr>
<tr>
<td>Weekly Feed</td>
</tr>
<tr>
<td>Disk, Tape, and Cartridge</td>
</tr>
<tr>
<td>FTP</td>
</tr>
<tr>
<td>EDT</td>
</tr>
<tr>
<td>Internment</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Large Chains</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Data Warehouse</td>
</tr>
<tr>
<td>Weekly Feed</td>
</tr>
<tr>
<td>Disk, Tape, and Cartridge</td>
</tr>
<tr>
<td>FTP</td>
</tr>
<tr>
<td>EDT</td>
</tr>
<tr>
<td>Internment</td>
</tr>
</tbody>
</table>

H = Highly Compatible   E = Effective   N = Not Compatible
Medium chains and large chains provide an environment for Weekly and Daily Feeds via electronic delivery (figure 6). The electronic weekly and daily feed is a result of the need for frequent data transmission within the stores and/or data warehouse. The effective management of inventory and cost requires frequent remote communication within the organization. As a result of the required remote communication, the medium and large chains require an information technology department or third party Information Technology support vendor.

In certain circumstances, large chains require more frequent feed than electronic weekly delivery (figure 6). In this situation, the chains establish a trickle feed environment. This type of environment allows a more real time inventory and cost management.

Small chains provide an environment for Weekly Data Feeds via electronic delivery (figure 6). The electronic weekly feed is a result of limited resources for small chains. Frequency of data transmission is not necessary because of a small number of stores in a small chain. Stores are in close proximity, which reduces the requirement for frequent data transmission. As a result of infrequent data transmission, the Information Technology support is minimum.
References

Phil R Kaufman. (May-August 2000). "Structural Change in the U.S. Food Industry". Food Review. 32 – 34


David A. Stamper. Local Area Networks. Published by The Benjamin/Cummings Publishing Company, Inc. Copyright 1994. 150 - 154
Appendix A: Retailer Surveys

Retailer Information Technology Summary

<table>
<thead>
<tr>
<th>Retailer</th>
<th>Operating Systems</th>
<th>POS Systems</th>
<th>Host Systems</th>
<th>Communication Media</th>
<th>Corporate Data Retrieval</th>
<th>Back Data Available</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retailer A</td>
<td>Main Frame</td>
<td>IBM 4680/4690</td>
<td>Yes</td>
<td>EDT</td>
<td>Daily</td>
<td>Yes - 2 years</td>
</tr>
<tr>
<td>Retailer B</td>
<td>Main Frame</td>
<td>IBM 4680/4690</td>
<td>Teradata</td>
<td>FTP/Tape</td>
<td>Daily</td>
<td>Yes - 2 years</td>
</tr>
<tr>
<td>Retailer C</td>
<td>unknown</td>
<td>IBM 4680/4690</td>
<td>Yes</td>
<td>FTP/Tape</td>
<td>Daily</td>
<td></td>
</tr>
<tr>
<td>Retailer D</td>
<td>Main Frame</td>
<td>NCR Unity</td>
<td>Yes</td>
<td>EDT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retailer E, F, G</td>
<td>Main Frame</td>
<td>IBM 4690</td>
<td>In-House System</td>
<td>FTP</td>
<td>Daily</td>
<td></td>
</tr>
<tr>
<td>Retailer H</td>
<td>Main Frame</td>
<td>NCR</td>
<td>OS 390 w/ DB2</td>
<td>FTP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retailer I</td>
<td>Main Frame</td>
<td>IBM 4690</td>
<td>In-House System</td>
<td>EDT</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Retailer Questionnaire - A

Retail Chain: Retailer A

Date: 10/13/02

Update:

Retail Contact:

Supplier Manager:

Type of Retailer: ☒Grocery ☐Mass ☐Drug ☐Liquor ☐Convenience

System/Technical Information:

1. What type of POS system(s) in use in your stores? IBM 4680/4690

2. Do you have a host-supported system? ☒Yes ☐No (If no, skip to question 3)
   • What Host system are you currently using? Yes
   • What information does the host supply? (desc, price)
   • What information is store level data? (upc, movement, desc, price)
   • If items are built in at the store level, will third party vendor receive these records? ☐Yes ☐No
   • Is movement calculated? ☐Yes ☐No

(Calculated movement is when only upc and dollars are pulled from the store. Movement is then calculated by dividing dollars by host price.)

• How often is data uploaded from stores? ☐Hourly ☒Daily ☐Weekly

• Is data from stores reprocessed at host? ☐Yes ☐No

• Does data from stores reside in a database structure? ☐Yes ☐No

3. What type of Platform does your system run on? (Mainframe, Unix)

4. Data communication currently used to transfer to third party vendor? (Tape, Cart, EDT, Ftp, Async,) EDT

5. Interest / Ability to change to another communication option? ☐Yes ☒No Choice
Retailer Questionnaire - B

Retail Chain: Retailer B

Date: August 13, 2002

Update:

Retail Contact:

Supplier Manager:

Type of Retailer: ☒Grocery ☐Mass ☒Drug ☐Liquor ☐Convenience

System/Technical Information:

6. What type of POS system(s) in use in your stores? IBM 4680/4690

7. Do you have a host-supported system? ☒Yes ☐No (If no, skip to question 3)
   - What Host system are you currently using? Teradata
   - What information does the host supply? (desc, price)Price and Description
   - What information is store level data? (upc, movement, desc, price)Movement
   - If items are built in at the store level, will third party vendor receive these records? ☐Yes ☒No
   - Is movement calculated? ☒Yes ☐No

(Calculated movement is when only upc and dollars are pulled from the store. Movement is then calculated by dividing dollars by host price.)

- How often is data uploaded from stores? ☐Hourly ☒Daily ☐Weekly
- Is data from stores reprocessed at host? ☒Yes ☐No
- Does data from stores reside in a database structure? ☒Yes ☐No

8. What type of Platform does your system run on? (Mainframe, Unix)

9. Data communication currently used to transfer to third party vendor? (Tape, Cart, EDT, Ftp, Async,) FTP and Tape

10. Interest / Ability to change to another communication option? ☐Yes ☒No Choice
Retailer Questionnaire - C

Retail Chain: Retailer C

Date: 9/14/02

Update:

Retail Contact:

Supplier Manager:

Type of Retailer: ☑Grocery ☑Mass ☑Drug ☐Liquor ☐Convenience

System/Technical Information:

11. What type of POS system(s) in use in your stores? IBM

12. Do you have a host-supported system? ☑Yes ☐No (If no, skip to question 3)

- What Host system are you currently using?
- What information does the host supply? (desc, price)
- What information is store level data? (upc, movement, desc, price)
- If items are built in at the store level, will third party vendor receive these
  records? ☑Yes ☐No

- Is movement calculated? ☐Yes ☑No

(Calculated movement is when only upc and dollars are pulled from the store. Movement
is then calculated by dividing dollars by host price.)

- How often is data uploaded from stores? ☑Hourly ☑Daily ☐Weekly

- Is data from stores reprocessed at host? ☑Yes ☐No

- Does data from stores reside in a database structure? ☑Yes ☐No

13. What type of Platform does your system run on? (Mainframe, Unix)

14. Data communication currently used to transfer to third party vendor? (Tape, Cart, EDT, Ftp,
    Async.,) FTP

15. Interest / Ability to change to another communication option? ☑Yes ☐No  Choice
Retailer Questionnaire - D

Retail Chain: D

Date: 8/20/02

Update:

Retail Contact:

Supplier Manager:

Type of Retailer: ☑Grocery ☐Mass ☐Drug ☐Liquor ☐Convenience

System/Technical Information:

1. What type of POS system(s) in use in your stores? NCR Unity

2. Do you have a host-supported system? ☑Yes ☐No (If no, skip to question 3)
   - What Host system are you currently using?
   - What information does the host supply? (desc, price)$,desc.dept
   - What information is store level data? (upc, movement, desc, price)movement
   - If items are built in at the store level, will third party vendor receive these records? ☑Yes ☐No
   - Is movement calculated? ☑Yes ☐No

   (Calculated movement is when only upc and dollars are pulled from the store. Movement is then calculated by dividing dollars by host price.)

   • How often is data uploaded from stores? ☐Hourly ☑Daily ☐Weekly
   • Is data from stores reprocessed at host? ☑Yes ☐No
   • Does data from stores reside in a database structure? ☑Yes ☐No

3. What type of Platform does your system run on? (Mainframe, Unix)unix

4. Data communication currently used to transfer to third party vendor? (Tape, Cart, EDT, Ftp, Async,) none

   Interest / Ability to change to another communication option? ☑Yes ☐No Choice
Retailer Questionnaire – E, F, and G

Retail Chain: Retailer E, F, and G

Date: 9/14/02

Update:

Retail Contact:

Supplier Manager:

Type of Retailer: ☑Grocery ☐Mass ☐Drug ☐Liquor ☐Convenience

System/Technical Information:

1. What type of POS system(s) in use in your stores?
2. Do you have a host-supported system? ☐Yes ☐No (If no, skip to question 3)
   • What Host system are you currently using?
   • What information does the host supply? (desc, price)
   • What information is store level data? (upc, movement, desc, price)
   • If items are built in at the store level, will third party vendor receive these records? ☐Yes ☐No

   • Is movement calculated? ☐Yes ☐No

   (Calculated movement is when only upc and dollars are pulled from the store. Movement is then calculated by dividing dollars by host price.)

   • How often is data uploaded from stores? ☐Hourly ☐Daily ☐Weekly
   • Is data from stores reprocessed at host? ☐Yes ☐No
   • Does data from stores reside in a database structure? ☐Yes ☐No

3. What type of Platform does your system run on? (Mainframe, Unix)
4. Data communication currently used to transfer to third party vendor? (Tape, Cart, EDT, Ftp, Async,) FTP
5. Interest / Ability to change to another communication option? ☐Yes ☐No Choice
Retailer Questionnaire - H

Retail Chain: Retailer H

Date: 10/15/02

Update: 

Retail Contact: 

Supplier Manager: 

Type of Retailer: ☐Grocery ☐Mass ☑Drug ☐Liquor ☐Convenience

System/Technical Information:

6. What type of POS system(s) in use in your stores?

7. Do you have a host-supported system? ☑Yes ☐No (If no, skip to question 3)
   - What Host system are you currently using? OS/390 with DB2
   - What information does the host supply? (desc, price)
   - What information is store level data? (upc, movement, desc, price)
   - If items are built in at the store level, will third party vendor receive these records? ☐Yes ☐No
   - Is movement calculated? ☐Yes ☐No

(Calculated movement is when only upc and dollars are pulled from the store. Movement is then calculated by dividing dollars by host price.)

• How often is data uploaded from stores? ☐Hourly ☑Daily ☐Weekly
• Is data from stores reprocessed at host? ☑Yes ☐No
• Does data from stores reside in a database structure? ☑Yes ☐No

8. What type of Platform does your system run on? (Mainframe, Unix) Mainframe

9. Data communication currently used to transfer to third party vendor? (Tape, Cart, EDT, Ftp, Async,) FTP

10. Interest / Ability to change to another communication option? ☐Yes ☑No Choice
Retailer Questionnaire - I

Retail Chain: Retailer I

Date: 9/21/02

Update: 10/11/02

Retail Contact:

Supplier Manager:

Type of Retailer: Grocery □ Mass □ Drug □ Liquor □ Convenience

System/Technical Information:

1. What type of POS system(s) in use in your stores? IBM 4690

2. Do you have a host-supported system? □ Yes □ No (If no, skip to question 3)
   - What Host system are you currently using? Proprietorship
   - What information does the host supply? (desc, price)description and price
   - What information is store level data? (upc, movement, desc, price)movement
   - If items are built in at the store level, will third party vendor receive these records? □ Yes □ No
   - Is movement calculated? □ Yes □ No

(Calculated movement is when only upc and dollars are pulled from the store. Movement is then calculated by dividing dollars by host price.)

- How often is data uploaded from stores? □ Hourly □ Daily □ Weekly
- Is data from stores reprocessed at host? □ Yes □ No
- Does data from stores reside in a database structure? □ Yes □ No

3. What type of Platform does your system run on? (Mainframe, Unix)

4. Data communication currently used to transfer to third party vendor? (Tape, Cart, EDT, Ftp, Async,) EDT

5. Interest / Ability to change to another communication option? □ Yes □ No Choice
Appendix B: Retailer Flowcharts
Multiple Data Warehouse - Weekly Feed

Corporate

Store Level

4680/4690 System - IBM System iPOS

Retailer B: File
Single Warehouse - Daily Feed - Multiple Store Names

Corporate

Store Level

FTP

Dataflow

Retailers - D. E.

Patterns - File

System - POS

4680/4690

1014

Store - File

FTP