Provisioning of Virginia Corrections and Mental Health Systems: A Supply Chain Analysis

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The distribution of foodstuff and other essential commodities for state, federal, and municipal agencies requires substantial investment of public funds. For most governments, there are two important cost centers for these activities: corrections facilities and mental health/mental retardation facilities and their related supply chains. The systems and processes presently used to service these critically important agencies have developed over literally centuries of operation and are thereby ripe for close examination. Additionally, in an era where the public’s appetite for funding of any sort has diminished, it is imperative to consider the full array of options available. This study will examine the variety of strategies currently employed by states to deliver provisions to corrections systems.

Virtually every state and large municipality is involved in the operation and management of large supply networks. For example, the California Department of Corrections currently has over 160,000 inmates confined in their corrections system and manages a total annual budget of approximately $5.4 billion. The large numbers of inmates are not restricted to states: Cook County (Chicago) had an average daily inmate count of 10,641 during 1998 and Los Angeles County slightly above 20,000 inmates in 1999. This coupled with the current cost estimates of incarcerating a corrections inmate, $20,000 per year, has most states and municipalities looking for ways of reducing their costs.

Yet, there are a number of factors complicating cost reduction efforts. First, inmate populations are growing dramatically. A national trend toward more punitive sentencing has been reinforced by legislation called Truth-in-Sentencing (TIS). These are federal guidelines that are being adopted by many states and, in general, they mandate that any individual convicted for a crime requiring a sentence of 20 years, or greater, must serve a minimum of 85% of their sentence. Obviously, the impact of TIS will place additional pressure on an already exploding corrections population. The opposite trend has been observed in mental health — fewer clients are being served in institutional settings like hospitals and large residential facilities. But the clientele at these institutions are often far more costly to supply and maintain due to specialized dietary and other needs.

Secondly, functions that were once thought of as the exclusive domain of public agencies are now being considered as candidates for “privatization.” This presents decision-makers with new and more complex sets of choices that must be considered. For example, should all parts of the supply chain be considered as candidates for privatization, or are there individual elements of the system that must remain under governmental control?
Fortunately, there are techniques and concepts available to decision makers that have evolved from the research done in the area of supply chain management. Not surprisingly, the area of supply management has been discussed for many years (Bowersox and Closs, Dobler and Burt). More recently, the field has been expanded to include numerous advances in information technology and the unification of logistics, purchasing, transportation, inventory control, and distribution (Handfield and Nichols). This broader view has permitted managers an opportunity to fine-tune their supply chains. The sources above provide excellent conceptual frameworks for understanding and organizing the provisioning supply chains. Similarly, demand management in the service management literature (Lovelock; Northcroft and Chase), the seminal concept of the value chain (Porter), and the related concept of the virtual value chain (Rayport and Sviokla) also help guide decision makers with this difficult problem.

**Project Background**

Our study, completed in 1998, was supported by a grant from the Virginia Department of Planning and Budget to study the state’s central distribution center for foodstuff and supplies, the Virginia Distribution Center (VDC). The distribution center was in a state of disrepair and sorely needed better information technology to provide approximately 950 products to the 70 locations throughout the state. A decision to renovate the facility implicitly supported a strategy of continued direct state operation and control, although there are many variations of supply chain configurations available within this strategy. Our charge was to consider alternative strategies to the state operated central distribution.

We gathered information from other states regarding the configuration and management of their supply chain provisioning systems. Several states had devised interesting and highly varied

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**Table 1: Analysis Issues of Importance**
approaches for operating their provisioning systems. A total of nine states were finally selected to exemplify a broad spectrum of strategies — Virginia, New York, Florida, Maryland, Pennsylvania, North Carolina, South Carolina, California, and Georgia. Given the variety of strategy choices available, we realized the need for a formal analytical process to assess these complex strategies. We selected Supply Chain and Process Flow Analysis to analyze these systems at a macro and micro level and to classify and compare the various modes of operation.

**Analytical Framework**

Although we were principally charged with determining the advisability of renovating the aging central distribution center, we were also interested in the broader issue of determining the variety and suitability of supply chain strategies currently in use by other states. Additionally, we analyzed alternative systems based on observation of VDC, the systems of other states, and modern practice in supply chain management. Table 1 shows the issues that were determined to be of importance to our analysis.

**Survey of state distribution systems**

Information regarding the specific operation of a state’s foodstuff and supply distribution system is difficult to collect, but it appears that a variety of models exist. The models can be quite complex and sophisticated. Their complexity and diversity stem from the equally diverse goals of each state. Some states are focused on rationalizing costs and capital expenditures while other states are more concerned with the utilization of corrections inmates in contributing to their own dietary needs. Additionally, the magnitude of the client population and its rural or urban geographic location can play a major role in system operation. Yet, the size of the client base is not always indicative of the type of system that is utilized by a state. For example, New York is almost completely privatized in supply and distribution to its corrections system while California operates its own supply and distribution system with very tight control. Maryland is also converting to a privatized meal supplier while South Carolina has abandoned privatized supply to return to a VDC-like operation.

Virginia’s use of VDC is quite typical of a state attempting to capitalize on the economies of scale associated with purchasing, delivery, and ordering, although a number of states are quite conscious of the cost of holding stock in a centralized warehouse (Maryland, California, Florida). Additionally, these systems provide for the individual facilities to purchase on state contracts (outside VDC), and, in some cases, directly from local providers.

Interviews were conducted with a selected group of states to determine the form of operation they employ and their experience with their systems. Appendix A provides some specific details for eight states — New York, California, South Carolina, Georgia, North Carolina, Florida, Maryland, and Pennsylvania.

**Alternative distribution models**

In this section, we identify a number of alternative models for the distribution of food, food service items, paper, and other products presently supplied by VDC. These alternatives have been developed through our survey of practices in other states, by our observations of the present Virginia system, and our experience in logistics systems design and operation. We begin by describing the Virginia system in detail to establish the scope of the system under study and to establish a basis for comparison. We then describe the following three alternatives developed from the combined analysis and observation of Virginia, other states, and modern logistics systems practice:

- the elimination of the central warehouse by outsourcing to one or more food service companies,
• an extension that provides just-in-time delivery to the point-of-use, and
• a further extension that centralizes meal preparation by means of a cook-chill system.

These alternatives are not the only ones possible; however, they represent a reasonably broad set of alternatives and should be considered to be points along a continuum of solutions that differ in terms of degree of centralization, product breadth, and geographical coverage. There may be, for example, certain product/customer groups in certain regions of the state that should follow one of these models, while other product/customer groups elsewhere should follow another.

Present system

The present system is illustrated in Figure 1. This figure contains two views of the system: the topmost view illustrates the flow of products through the system, beginning with the manufacturer/distributor of the goods and ending with the distribution of complete meals to a dining area. The bottom view identifies the value-added chain of activities required to achieve the product flows and identifies the parties that are responsible for each value-adding activity. In this case, the value-added chain is represented as a series of interlinked primary activities that occur in sequence (along the bottom of the stylized arrow) and a group of support activities that are necessary to support the primary activities (along the top of the stylized arrow). In general, primary activities are associated with the physical handling of the goods as they move along the value-chain, while support activities involve planning, administrative, and other ancillary functions that are not directly associated with day-to-day product flow. The gray areas represent the profit margins of the participants.

Product flow in the present system operates as follows (refer to the top part of Figure 1):

1. Manufacturers and/or distributors supply products to the Central Warehouse under centrally negotiated contracts.
2. Virginia Correctional Enterprises (VCE) supplies certain products (e.g.: hand soaps, detergents) to the Central Warehouse.
3. In response to purchase orders from clients (we have classified clients as Corrections, MHMRAS, and Other), Central Warehouse prepares shipments that are then delivered to client-site warehouses by a private trucking company.
4. VCE delivers non-VDC stock items (e.g.: furniture, clothing) directly to the same client-site warehouses, again in response to client purchase orders.
5. In the case of Corrections clients, other suppliers deliver non-VDC stock items (typically perishable food products such as dairy items, fresh produce and bread, and pharmaceuticals) to the same client-site warehouse. In general, these warehouses are located outside of the secure areas of correctional facilities (although there is at least one exception — St. Brides, the oldest corrections unit in Virginia), thereby permitting deliveries without the need to search trucks before and after unloading. In all of the facilities we contacted, deliveries from suppliers other than VDC are at least daily events.
6. In the case of MHMRAS facilities (both hospitals and training centers), other suppliers deliver to the client-site warehouses and, in many cases, directly to the Food Service locations. In some cases, products are delivered directly to the kitchens.
7. In the case of Corrections,
7a. The Food Service department
Figure 1: Present System — Product Flow and Value-added Chain
requisitions food items from the site warehouse. The frequency of this requisitioning process varies from daily to weekly, depending on the size of the inventory holding area in Food Services. The requisitioned goods are picked from stock and transported to the Food Service inventory holding area within the secure area of the Corrections facility, where they are stored until required for meal preparation.

7b. Goods are withdrawn from the Food Service storage area by the kitchen staff and are used to prepare food dishes conforming to menu plans established at a state level. Menus are typically known at least six months in advance.

7c. Prepared food dishes are delivered to central dining areas, where they are served to inmates and staff.

7d. Non-food products are requisitioned by custodial staff, health-care providers, etc. on an as-needed basis and are delivered to storage closets within the secure area where they are kept until used.

8. In the case of MHMRAS, the process is analogous, with the following differences:

8a. Since security is less of a concern, there is much less energy expended on keeping goods under lock-and-key, searching, etc. Deliveries from the site warehouse to the Food Service area are typically more frequent than for Corrections.

8b. Menus tend to be more varied from facility-to-facility due to specialized dietary needs of patients. In many cases, however, there is little variation across time in menus within one facility. This is particularly true of Training Centers, where patient turnover is very low (a few changes each year at one of the facilities we examined in detail).

8c. In some cases, prepared meals are delivered directly to the bedside or cottage.

8d. Again, there is less concern with security.

9. The Central Warehouse serves a large number of small clients (e.g.: universities, local governments), often in remote parts of the state and often with comparatively low volume. In total, these other clients represent about 20% of VDC revenues.

The bottom part of Figure 1 illustrates the major activities required to achieve this product flow, the entity that performs each activity, and the places where profits are taken. Each activity adds cost. The purpose of this type of process representation is to focus attention on where value is added and to identify redundant or unnecessary activities that are adding costs without a commensurate increase in value.

Observations about the present system

1. In any logistics system, one important determinant of cost is the amount of variation that exists in the demand for goods. On-hand inventory must be maintained to allow for unforeseen fluctuations in the demand for goods during the suppliers' lead times (the time required to order and receive replenishment stock). This type of inventory (safety stock) increases as the variation in demand increases. The logistics system being analyzed here is remarkably free of demand variation due to the predictability of menus and the stability of the population. Consequently, it should be possible to operate this system with lower levels of safety stock (and therefore at lower cost) than is typically required.

2. Another important determinant of inventory
cost in a logistics system is the frequency of deliveries. The average amount of inventory that must be maintained to satisfy demand between consecutive order receipts is called the cycle stock and is inversely proportional to delivery frequency. If, for example, orders are received once a month, on average one-half of the month's demand must be held as cycle stock, whereas if orders are received twice a month, on average only one-quarter of the month's demand must be held as cycle stock. The inventory cost savings associated with frequent orders must be balanced against the higher costs associated with these more frequent orders (ordering and transportation costs). In the present logistics system, it appears that order frequency is determined by transportation costs alone – VDC reduces its transportation costs by shipping in full (or near-full) truckload quantities. The implications of this are that low-volume customers are forced to maintain high levels of cycle stock because their demand generates truckload quantities infrequently and conversely that high-volume customers are able to maintain lower levels of cycle stock because their demand generates truckload quantities more frequently. It is not clear whether this is good or bad from a total-cost perspective. It may be an excellent strategy for some customers, but it may also be inappropriate for some customers. Regardless, order frequency should be determined by considering the tradeoffs between inventory costs and order/transportation costs as described earlier. We found no evidence that this is being done.

3. Goods are handled frequently in this system (Manufacturer/Distributor outbound personnel, Central Warehouse inbound and outbound personnel, site warehouses inbound and outbound personnel, Food Services inbound and outbound personnel, kitchen and custodial personnel). Each time the product is handled, costs are added.

4. Goods are stored frequently in this system (Manufacturer/Distributor, Central Warehouse, site warehouses, Food Services storage areas, storage closets). Table 2 identifies the types of costs that are incurred each time goods are stored.

5. We found no evidence of a comprehensive analysis of the total cost of operating this system (i.e.: an analysis that includes the handling and inventory costs of the system at both the central and local warehousing sites). This is understandable, given that the governance structure of this process is decentralized and there is no single point of accountability for the total cost of acquisition, storage, transportation, and use of VDC-supplied products. In our discussions with other states, however, we have learned that when a total-cost analysis of this type is undertaken, it frequently results in a radical re-design of the system — one
that can eliminate the central warehousing function.

Alternative 1: Eliminate the Central Warehouse

Motivation

While centralized contract negotiation and monitoring (including quality control) clearly add significant value due to economies of scale in purchasing and administration, it is not clear that receiving, storing, maintaining, picking, and preparing goods for shipment at the Central Warehouse are value-adding activities. These same services are also performed by the manufacturers/distributors who supply VDC (see the value chain in Figure 1) so the services are replicated without any corresponding value-added. Delivering goods directly to the site warehouses from manufacturers/distributors would remove one complete set of handling and holding costs from the total system cost.

Description of alternative system

Product flow in this alternative operates as follows (refer to the top part of Figure 2 – activity numbers are the same as in Figure 1).

1. In response to purchase orders from Corrections and MHMRSAS clients, manufacturers and/or distributors supply products directly to client-site warehouses under centrally negotiated contracts.

2. Eliminated (VCE to Central Warehouse).

3. Eliminated (Central Warehouse to site warehouses).

4. through 8.: Same as in present system.

9. In response to purchase orders from clients other than Corrections and MHMRSAS, manufacturers and/or distributors supply products directly to client-site warehouses under centrally negotiated contracts.

Observations about this alternative

1. One complete set of ordering, transportation, handling, and holding costs has been removed from the total system cost, together with many of the overhead costs and all of the capital costs required to operate the Central Warehouse. In particular, the capital investment in a new VDC warehouse has been avoided. Offsetting these reductions, however, are several areas where costs may increase:

   • Some current suppliers may lack the product breadth and/or distribution infrastructure to economically serve a large number of geographically dispersed clients. In such cases, they may be unwilling to participate, thereby forcing a change to a (perhaps more expensive) supplier.

   • The Central Warehouse currently offers a “one-stop-shop” for all of the products that it supplies. If these products are instead to be provided by a large number of suppliers, ordering and receiving costs may increase at the client sites. Importantly, however, all of the sites that we visited had adequate ordering and receiving capacity to support a substantial increase in the number of suppliers without incurring any additional costs. In most cases, the Central Warehouse is presently only one of dozens of suppliers from whom goods are ordered, and often only one of hundreds of deliveries received each month.

2. The costs and profit margin of the trucking company that moves goods between the Central Warehouse and the client sites have
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Figure 2: Alternative 1 — Eliminate Central Warehouse
be removed. Similar costs, however, will be incurred by the manufacturers/distributors as they move goods between their facilities and the client sites.

3. Our preliminary investigations indicate that there are several food service companies who are interested in the possibility of acting as a single source for all products presently supplied by VDC, and, in addition, to provide many products that are not presently supplied by VDC (e.g.: perishable food items, produce). If one of these suppliers is chosen, then it may be possible to reduce ordering costs (only one order instead of dozens) and receiving costs (only one delivery each day instead of many) at client sites by eliminating steps 5 and 6 in Figure 2. It may also be possible to obtain better product prices due to volume purchase agreements. Finally, by allowing more frequent deliveries, substantial savings may be possible through the reduction of cycle stock at client sites.

Clearly, there are complex cost tradeoffs, scale economies, and marketplace dynamics that prevent a definitive conclusion on how this alternative compares to the present system, in terms of both cost and level of customer service. The only way to determine the economic viability of this (and the alternatives that follow) is to undertake a comprehensive study involving levels of data analyses and supplier involvement that are beyond the limited scope of this study.

In favor of this alternative, we can point to other states that have eliminated the central warehousing function after such a study (see previous section entitled Survey of State Distribution Systems). Other states have implemented (or are in the process of implementing) a cook-chill system (see Alternative 3 below) that eliminates the need for central warehousing and distribution of the type provided by VDC. Undertaking large capital investments now (e.g.: the new central warehouse) to sustain a VDC operation effectively eliminates this as a near-term option.

**Alternative 2: Just-In-Time Delivery to Point-Of-Use**

**Motivation**

A significant proportion of the total cost of operating this system is incurred at client sites. In the case of food products, for example, each of the 17 MHMRSAS locations and most of the 50-plus Corrections facilities must establish and maintain an independent infrastructure that is capable of:

- establishing logistics policies (e.g.: safety and cycle stock levels, inventory management and distribution policies),
- monitoring inventory levels,
- issuing replenishment orders in compliance with state contracts,
- receiving and storing goods on a daily basis in long-term warehousing facilities capable of maintaining room-temperature, refrigerated and frozen products,
- supporting product withdrawal from these warehouses (i.e.: an information sub-system for product requisition and inventory management) and physical distribution to smaller on-site warehousing facilities also capable of maintaining room-temperature, refrigerated and frozen products.

In effect, each location must operate a multi-echelon logistics sub-system, with all of the attendant management support system costs, capital investments, and operating costs. Taken individually, the resources required to operate these systems can seem insignificant, and they are frequently difficult to identify precisely. Overlapping job responsibilities often obscure human resource costs, for example, and capital costs are either ignored (in the case of inventory) or considered as sunk costs (in the case of
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When these resources are considered collectively, however, their cost contribution appears to be significant. Although a precise quantification of these costs is beyond the scope of this study, an informal analysis indicates that:

- there are approximately 260 people (full-time-equivalents) engaged in logistics activities in Corrections and MHMRSAS, and
- there is a total of approximately 357,000 square feet of warehouse space at Corrections and MHMRSAS locations (compared, for example, to 155,000 square feet at the existing Central Warehouse).

One alternative that allows for at least a partial dismantling of this infrastructure is to structure the system in a way that centralizes inventory decision-making and eliminates long-term warehouses at client sites, at least for food products. To accomplish this, suppliers would deliver “just-in-time” directly to storage facilities within food service areas in response to orders placed by a centralized group responsible for inventory monitoring and replenishment at client sites.

**Description of alternative system**

Product flow in this alternative operates as follows (refer to the top part of Figure 3).

1. In response to purchase orders from VDC (or some other centralized order point), manufacturers and/or distributors supply products directly to client-sites under centrally negotiated contracts. In the case of food-items to MHMRSAS sites, delivery is made directly to short-term storage facilities adjacent to kitchens. In the case of food-items to Corrections locations, delivery is made to a temporary receiving area outside the secure area, but is moved immediately to short-term storage facilities adjacent to kitchens by Corrections personnel. Non-food items to both MHMRSAS and Corrections locations are handled through a (much smaller) site warehouse, as in the present system.

VDC establishes inventory policies (re-order points, order-up-to levels) for all client sites and monitors on-hand inventory levels via a computerized network employing bar-coding and other advanced inventory-control mechanisms to track withdrawals from stock remotely. When these on-hand inventory levels fall below their re-order points, VDC issues replenishment orders to the appropriate supplier and monitors the progress of order fulfillment. Alternatively, inventory tracking and replenishment could be performed by the manufacturers/distributors. Many full-service suppliers are willing and able to participate in this type of “supplier-managed inventory” process, including the supply and support of the required computer hardware and software.

2. Eliminated (VCE to Central Warehouse).

3. Eliminated (Central Warehouse to site warehouses).

4. VCE delivers non-VDC stock items (e.g.: furniture, clothing) directly to the same client-site warehouses, in response to client purchase orders. Alternatively, ordering these stock items could also be managed centrally.

5. Delivery of perishable food products such as dairy items, fresh produce and bread, and pharmaceuticals are delivered to Corrections clients as in Step 1. If a full-service distributor is used in Step 1, the same provider could potentially meet these other needs as well, thereby eliminating this step.

6. Same as Step 5, but for MHMRSAS.
Figure 3: Alternative 2 — Just-In-Time To Point-Of-Use
7. In the case of Corrections,
   7a. Eliminated.
   7b. No change.
   7c. No change.
   7d. No change.

8. In the case of MHMRSAS,
   8a. Eliminated.
   8b. No change.
   8c. No change.
   8d. No change.

9. In response to purchase orders from clients other than Corrections and MHMRSAS, manufacturers and/or distributors supply products directly to client-site warehouses under centrally negotiated contracts. Optionally, some of these customers may want to participate in the centralized inventory management services, thereby reducing or eliminating their logistics management costs.

**Observations about this alternative**

A second complete set of ordering, transportation, handling and holding costs has been removed from the total system cost. With this alternative, food items are handled and stored only once prior to use and are located very close to where they are used so that transportation overheads are minimized. Furthermore, site warehouses are required only for bulky non-food items (e.g.: clothing, furniture, certain hazardous materials) and can therefore be much smaller and more easily managed (no refrigeration or freezers, relatively infrequent additions to, and withdrawals from stock, etc.). Finally, since the logistics process is managed centrally, there is much less need for local expertise and administrative support for the ordering, receiving, and other cost-adding inventory activities identified earlier.

This model of distribution closely resembles practice in private industry, where “vendor-managed inventory” is becoming commonplace as firms reengineer their business processes to improve efficiency and effectiveness, and to allow management to focus on core competencies. Again, however, from the perspective of the relative cost to the state to operate a system of this type, it will be necessary to undertake a more comprehensive analysis than we have been able to conduct to determine if costs can be reduced and service improved. In particular, potential operating and capital cost savings associated with dismantling the present logistics infrastructure at client sites must be weighed against potential increases in product and distribution costs (due to much more frequent, much smaller orders).

**Alternative 3: Centralized Cook-Chill System**

**Motivation**

To motivate the previous alternative, we suggested that a significant proportion of the total cost of operating this system is incurred at client sites, in the form of capital and operating costs associated with the logistics of food distribution. This alternative is motivated by the observation that an even greater proportion of total cost is associated with food preparation at client sites. Each of the 17 MHMRSAS locations and most of the 50-plus Corrections facilities have fully-staffed and fully-equipped kitchens capable of producing three-meals-a-day meals for, in some cases, several hundred people. Several states have moved towards large-scale centralization of the food-preparation process by instituting one or more central kitchens to prepare meals that are then distributed to client locations, where they are re-heated (called “re-therm”) and served. This
process (called “cook-chill”) capitalizes on the economies of scale associated with food preparation; it is cheaper to operate one large kitchen than to operate 70 small ones, particularly given the predictability and stability of menus of Corrections and MHMRSAS clients. There are many possible variations on this general theme. In the following sub-section, we describe a simple version of a cook-chill system.

Description of alternative system

The flow of food items in this alternative operates as follows (refer to the top part of Figure 4 – process steps are indicated with letters since they bear little resemblance to corresponding steps in previous alternatives).

A. Manufacturers/distributors deliver food items to storage facilities within the Central Kitchen. In the spirit of just-in-time inventory management and vendor-managed inventories, deliveries are daily, little or no long-term inventory is maintained at the Central Kitchen, and the vendors monitor and ship products according to inventory policies established by the state.

B. VCE delivers food items to the Central Kitchen, as above.

C. The Central Kitchen prepares meals in compliance with standard menus and the special needs of particular clients (special diets, for example). No inventory of prepared meals is maintained at this location. Meals are chilled and prepared for shipment. A private trucking company transports the completed meals to client locations, where they are received and placed in refrigerated storage areas near dining areas. Client locations maintain an inventory of prepared meals to protect against disruptions in service as necessary.

D. Depending on the completeness of the meals prepared by the Central Kitchen, it may still be necessary to receive certain perishable food items from local suppliers. In this case, these deliveries are accomplished as described in the previous alternatives.

E. Client sites withdraw prepared meals from inventory and re-heat them (re-therm).

F. Meals are served.

G. Existing services are maintained for other clients as in the previous alternative.

Product flow for non-food items occurs as in the previous alternative.

Observations about this alternative

This system represents a radical departure from the current method of operation. It requires substantial capital investments in centralized kitchen plant and equipment, and in re-therm equipment at client sites (although some of this equipment is presently available in the MHMRSAS system). The potential return on these investments seems substantial, however, since it allows for the near-complete dismantling of both the logistics activities and the food-preparation activities at over 70 sites. Several of the states we contacted are either actively engaged in the implementation of cook-chill systems, or have this model in mind as a longer-term strategy.

Conclusions and Summary

We have attempted to describe several alternative models for operating a state distribution system. Our intent has been to guide decision-makers toward promising alternatives that reduce costs and improve service. In doing so we have limited the number of alternatives to three that we have synthesized from those currently in practice. There are clearly many more alternatives, although most of these are probably hybrids, or minor variations of the three we chose.
Figure 4: Alternative 3 — Centralized Cook-Chill System
Nevertheless, from this preliminary analysis, a number of conclusions are apparent:

1. There are several viable alternatives to the traditional centralized distribution center that eliminate the need for state management and ownership of a central warehouse. Indeed, many of these alternatives seem to offer strong potential to outperform the state-operated systems in terms of cost and service by eliminating redundant activities and/or dismantling unnecessary infrastructure.

2. Choices must be examined in sufficient detail to assess their costs compared to alternative system operations costs.

3. In making such decisions, comprehensive study should be undertaken to assess the relative economic and service characteristics of, at a minimum, the three alternatives identified here.

In summary, we have found that systems like the VDC provide acceptable levels of service at reasonably competitive prices, even when compared to other wholesale sources. If the target position on the grid in Figure 5 is as indicated (low cost, high service), then state operated central distribution systems appear to be somewhere near the center of the grid. We have argued that the issue is not just how to reduce internal costs of operation for state operated distribution systems, but rather how can we reengineer the total supply chain, from product procurement to product consumption, in a way
that minimizes the total cost of all these services combined (see Figure 6). We have observed that there is a large investment and operating cost associated with the client-site logistics operations required to procure, receive, store and issue products and have identified just-in-time based alternatives that are operational in other states to avoid some or all of these costs. We have also identified the importance of maintaining centralized control over purchasing, contract administration and quality control, and have suggested that inventory and staffing reductions may be possible by centralizing inventory policy-making and day-to-day inventory management. Finally, we have described an alternative that centralizes meal-preparation to further reduce client costs. This “cook-chill” approach is either the current strategy or the central idea in long-term planning for several other states.

Clearly this is a complex business problem facing many states, and one that should be analyzed in a broader context – the entire supply chain. By not examining the entire supply chain it is quite possible that many of the cost savings may be overlooked. Supply Chain Analysis provides a thorough methodology that can be used to improve public sector operations by (1) systematically examining the current system of operations, and (2) by providing a mechanism that suggests alternatives to the current system.

Conclusions

Virginia undertook statewide hearings late in 1999 to obtain the input of concerned citizenry regarding the continued operation of their provisioning system. The debate of how to proceed was heated and controversial. Some felt that it would be unwise to allow privatization of the system while others maintained that it was a must. At this date the state has issued a request for proposal that seeks in Phase 1 to “evaluate the Commonwealth’s procurement and delivery system for food and related commodities. Provide recommendation as to whether there is a better, faster, cheaper system that should be used, or are there changes or a hybrid approach to the existing system that will improve operations.” Thus, the debate continues and will likely require more study before it is resolved.

References


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APPENDIX A

New York - New York has moved to a privatized system with a prime vendor, SYSCO (a major U.S. food distributor), providing service ($65 million) for the entire state corrections system. According to state officials and SYSCO representatives the arrangement has worked very well with improvement in service and variety of offerings. It is unclear if the privatization has led to lower overall costs of meals provided to corrections inmates, but officials suggest meal cost has stayed approximately the same and annual inventory holding cost has been reduced by $1 million.

California - California has a state run distribution system that is moving to distributed regional warehouses. They have a very sophisticated system with the largest corrections population in the nation (over 150,000 inmates). They make extensive use of their tremendous buying power and are probably the most prominent user of the cook-chill approach in the US, with 22 facilities throughout the state. They are quite cautious of private single source vendors suggesting that private firms cannot meet the service levels they desire.

South Carolina - In the case of a state similar to Virginia, South Carolina has returned to a state run distribution system after an unsuccessful attempt to privatize their system. They were unable to control vendors adequately. Like many southern states, they either have a mandate or history of utilizing inmate labor in the production of food and cattle products, which reduces costs to the extent that the possibility of private-sector competition is eliminated.

Georgia - Georgia operates a state distribution system that relies heavily on inmate produce, eggs, and pork. They have a VDC-like operation that incorporates central buying and deliveries on prescribed schedules. Their system appears to be even more centralized than Virginia and boast a $0.64 inmate meal cost. Their centralized system allows frequent opportunity buys through electronic network access to the USDA market system.

North Carolina - Essentially, they use a centralized distribution system. This state may be the most committed in the south to the use of inmate labor as a form of cost relief and also as a form of training. Their desire for self-sufficiency dictates a minimal use of outside vendors. Thus, they appear similar to Virginia in their distribution function.

Florida - Florida is attempting to operate a variety of systems in five geographical regions. The major rural region operates quite similarly to the current VDC operation and appears to be satisfied with performance. A more urban region (actually three combined regions) is undertaking a change to a prime vendor system similar to New York. Their goal in the prime vendor region is to improve service delivery through more frequent and just-in-time delivery, expand the variety of offerings, exploit opportunity buys and menu modification, and reduce inventory holding costs by eliminating warehouses. The contract takes effect April of 1998 and is a “cost plus fixed fee” arrangement to be offered to a single prime vendor— SYSCO, PYA Monarch, etc. The field food service personnel are concerned about the certainty of delivery since warehouses will not be used and shipments will be dropped directly from the prime vendor.

Maryland - Maryland has eliminated warehouses and is extensively using prime vendors for supply and food service. They employ a “supply drop” operation where products are delivered directly to a location with no intervening passage through a warehouse. They also are moving food preparation to privately operated central kitchens (one privately operated) and make extensive use of cook-chill technology. The change to privatization will require the re-assignment of approximately half of the current 52 state employees in their food service management function to contract monitoring functions — food...
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specification and cost.

**Pennsylvania** - The system used in Pennsylvania resembles that of VDC — centralized purchase through a standardized menu and distribution through a requisition system. They make no use of cook-chill technology and have no interest in prime source contracts. They also have a vigorous correctional enterprise system that takes advantage of low cost inmate labor, to the extent that they provide products to many other states. Their meal costs per inmate appear to be a bit higher than other states ($2.53 per day; this may be more a function of accounting than higher costs).