KMD Stores – new challenges in cold chain operations

KMD Stores headquartered in Denver, Colorado has a successful history in consumer goods for over 30 years. Trends in consumer behavior indicate that consumers prefer to have grocery items available in the same location as the place they purchase everyday items. While packaged food items will fit into current distribution system located throughout the western United States, fresh and frozen items present a completely different set of challenges. KMD Stores wants to maintain focus on its platform "Made in the Americas" for the expanded product offerings as well.

Current executives of KMD stores are faced with setting up a parallel distribution system for produce, dairy, and meats. All stores are located west of the Mississippi River. See Appendix A for the listing of current stores. Regional distribution centers are located in Kansas City, KS; Denver, CO; Walla Walla, WA; and Bakersfield, CA. Import Centers are located at Charleston, SC; Corpus Christi, TX; San Francisco, CA.

Augustine Carvalho, current CEO, has given Melissa Jones, Senior Vice President and director of Logistics the challenge of developing an efficient cold chain operation. An expert in dry goods and warehousing operations, Melissa has little experience in the procurement, transport, and storage of perishable items. Knowing the daunting responsibility placed before her, she contracted a consultant. Sara Anderson has worked in logistics for many years and is a regular contributor to the FOOD LOGISTICS newsletter. Amy Junker, a trucking expert for perishables had been recently hired at the import center in Charleston where she finished company training and is seen as an underutilized asset at that location. Melissa sought the approval of Mr. Carvalho to either transfer Amy to Denver or allow her to work full time with a virtual cross-functional team for a year to get the project up and going.

Melissa's strategy is to uncover key elements of the cold chain transportation systems. Her research indicates that three elements, as shown in Figure 1, are critical to success. Melissa is planning to build the design team to collaborate on these elements and the processes to design and operate the new company enterprise. This is the foundation for determining optimal locations for warehouses, operation technology choices as well as the inbound and outbound logistics management.

As depicted in Figure 1, product, distribution, and origin/destination are the three driving factors of the cold chain operation. Transportation and load integrity are both integral aspects of the overall flow of the system. Conditional demand throughout the company markets will drive the flow of the product through the entire system.

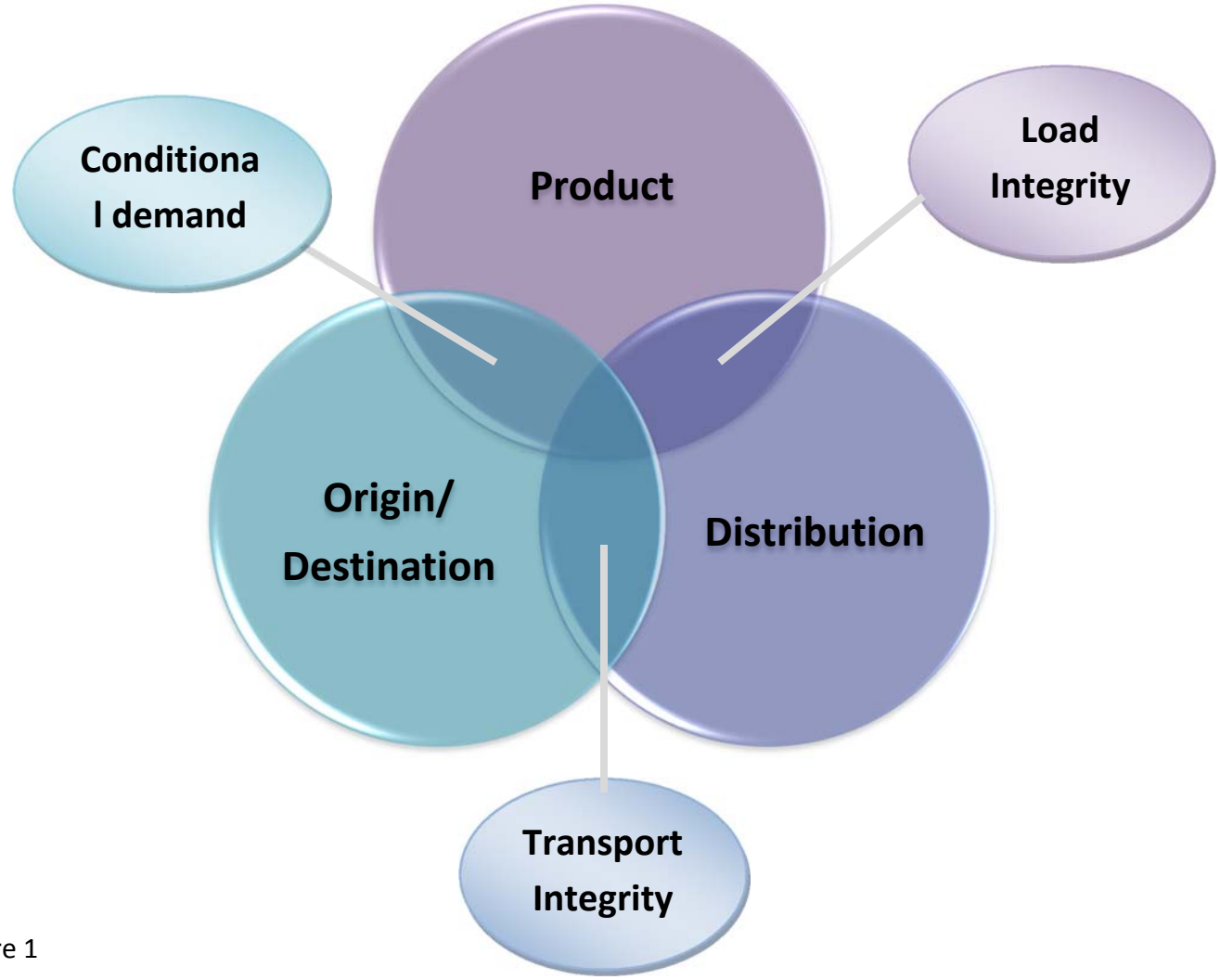

Figure 1

Given final approval, Amy Junker will relocate to Denver as part of the strategic planning team. An alternative plan of action or personnel must be sought if this ~~is~~ action is denied. Amy has initially suggested hiring two seasoned managers for the separate development of inbound and outbound logistics. The efforts of these managers must work in unison to maximize the flow of product coming in and out of facilities.

Sara Anderson has taken responsibility for the requirements of licensing and registration for the Food Storage Facility as required by the United States Government. She has also taken responsibility for developing the standards for KMD Stores concerning the integrity of product in the cold chain operation and the HACCP-Hazardous Analysis Critical Control Points. She has recommended that Quality control training by USDA technicians for all group team leaders. This training is approximately one month in length. Selection of the managers should occur early for training in Quality Control, systems orientations and hiring of teams when each facility is to be operational. Produce must be watched daily for the ripening levels, temperatures in the

buildings and for problems with incoming items. A scorecard for each inbound shipment has to be determined for usage with purchasing managers in Denver. The inbound team leaders are the eyes and ears of the buyers. Even with the high level of training and the installation of state-of -the-art software systems for product flow, Sara recommends using company inspectors for certain produce such as mushrooms and bananas due to the sensitive and critical challenges of these products. Using company inspectors may impact the inbound schedule so produce can be available when the inspectors are on site.

When entering a store, the first section seen is fresh produce. The quality of the merchandise in this area of first impression has an impact of a consumer's view of the overall retail facility. First and foremost is the look of the bananas available. Market research has indicated that bananas are the key indicator of quality perception to consumers in a grocery facility. This should be kept in mind as the overall strategy is built.

Melissa must assemble a strong management team to carry out the implementation of this project and has determined the several challenges to be addressed as priorities.

Initial Challenges:

- Selecting an efficient location for the cold storage food distribution site(s)(FDS)
    - number of facilities
    - locations in relationship to retail outlets
    - locations in relationship to the ports for best movement of imported produce (Appendix B & C)
    - locations of suppliers to allow for backload transport
    - how large of a geographical area or number of stores can a FDS effectively service
    - take into consideration the distance to and between stores for alignment with each load servicing more than one store during a single route
- Coordinating the procurement of, storage, and delivery of the goods to the final retail stores
    - purchasing team will be located in Denver headquarters
    - delivery time coordination of inbound product
    - policies developed for inbound scheduling
- Overall management of cold storage facility processes (Appendix E)
- Assessing outbound logistics options
    - own all trucks and trailers to have complete control of logistics,
    - utilize outside trucking companies for entire process,
    - own company trailers and control loads utilizing outside truck companies on contract.
    - How many units may be required for constant flow of moving the items, general routine maintenance and cleaning, and allowing for units awaiting repair
- Facing the challenges of the perishables short shelf life
    - Strawberries are the biggest challenge (Appendix D)
    - Temperature control in the warehouses and during transit at various optimum temperatures
- Overcome the limitations of store delivery times
    - four hour window during the early morning- forces night driving-
    - what special circumstances may need contingency planning

- Type of software systems available for determining inventory control, order handling, and transport integrity of the project as needed for the warehouse management

Augustine has set the goal for the first food distribution site to be operational in two years with 20 stores being revamped and ready to be providing perishable and other food products. He again reiterates the need to source from the Americas. He wants a long-term plan to then move forward with all the current stores operating with the new format and constructing 10 more stores per year within 5 years. So distribution centers have to both fit the current set of store operations and be capable of handing additional demand. The locations for the cold chain imports must also be selected for efficiency from the beginning with growth in mind. Once this strategy is put in place, the long term goals of KMD Stores would be to expand further east, especially into Illinois.

Your team and others have been assigned by Melissa to address the challenges above with the long term strategy and Mr. Carvalho's objectives in mind. Teams with the overall best assessments of the challenges and possibilities will be offered promotions to the implementation team to lead the effort. In a rapidly changing cold chain network, relying on older technologies is not suitable. Looking at best practices of industry leaders and leading edge handling equipment will be key to the success of the implementation. Strategic alliances, supplier relationships, and partnerships with various service providers are options available for consideration.

Appendix A- Store locations with metro population base

Arizona

Lake Havasu City-Kingman: 200,186
Tucson: 980,263
Prescott: 211,033

Arkansas

Little Rock- 709,901
Fayetteville-: 450,853

California

Santa Rosa: 488,116
Vallejo-Fairfield: 416,471
Santa Cruz 264,298
Yuba City: 167,497
Fresno: 942,904
Bakersfield: 851,710
Stockton: 696,214
Modesto: 518,522
Visalia-Porterville: 449,253
Santa Barbara 426,878
Salinas: 421,898
San Luis Obispo-Paso Robles: 271,969
Merced: 259,898
Chico: 220,266
Redding: 177,774
El Centro: 177,057
Hanford- 153,765

Colorado

Denver: 2,599,504
Boulder: 299,378
Greeley: 258,638
Colorado Springs: 660,319
Fort Collins: 305,525
Pueblo: 160,545

Idaho

Boise City: 616,561

Iowa

Des Moines: 556,230
Waterloo: 162,263
Iowa City: 152,263
Council Bluffs -IA: 865,350

Kansas

Kansas City
Wichita: 625,526
Topeka: 234,647

Missouri

Kansas City
Fayetteville: 473,830
Springfield: 440,142
Joplin: 176,849
Columbia: 175,831
Jefferson City: 150,480

Montana

Billings: 160,097

Nebraska

Omaha: 865,350

Nevada

Reno: 425,417

New Mexico

Albuquerque: 887,077
Las Cruces: 209,233

Oklahoma

Oklahoma City: 1,277,053
Tulsa: 946,962

Oregon

Salem: 390,738
Eugene: 351,715
Medford: 203,206

South Dakota

Sioux Falls: 228,261
Rapid City: 126,382

Texas

Sherman: 118,478
El Paso: 736,310
Corpus Christi: 415,810
Beaumont: 379,640
Killeen: 351,322
Lubbock: 261,411
Longview: 203,367
Amarillo: 241,515
Laredo: 231,470

Utah

Salt Lake City: 1,124,197
Ogden: 547,184
Provo: 526,810

Washington

Tacoma: 3,439,809
Olympia: 252,264
Bremerton: 251,133
Spokane: 471,221
Portland: 436,429
Kennewick: 253,340
Yakima: 243,231
Bellingham: 201,140

Wyoming

Cheyenne

Appendix B- harvest schedules

Type of produce/Month	January	February	March	April	May	June	July	August	September	October	November	December
Apple	US Canada	US Argentina Canada	US Argentina Canada Brazil Chile	US Argentina Canada Brazil Chile	US Argentina Canada Brazil Chile	US Argentina Canada Brazil Chile	US Argentina Canada Brazil Chile	US Canada	US Canada	US Canada	US Canada	US Canada
Asparagus	US Chile Peru Mexico	US Chile Peru Mexico	US Chile Peru Mexico	US Chile Peru Mexico	US Chile Peru Mexico	US Chile Peru Mexico	US Chile Peru Mexico	US Chile Peru Mexico	US Chile Peru Mexico	US Chile Peru Mexico	US Chile Peru Mexico	US Chile Peru Mexico
Banana	Nicaragua Belize Honduras Ecuador Costa Rica Brazil Guatemala Ecuador Panama	Nicaragua Belize Honduras Ecuador Costa Rica Brazil Guatemala Ecuador Panama	Nicaragua Belize Honduras Ecuador Costa Rica Brazil Guatemala Ecuador Panama	Mexico Belize Honduras Ecuador Costa Rica Brazil Guatemala Ecuador Panama Nicaragua	Mexico Belize Honduras Ecuador Costa Rica Brazil Guatemala Ecuador Panama Nicaragua	US Belize Honduras Ecuador Costa Rica Brazil Guatemala Ecuador Panama Mexico Nicaragua	US Belize Honduras Ecuador Costa Rica Brazil Guatemala Ecuador Panama Mexico Nicaragua	US Belize Honduras Ecuador Costa Rica Brazil Guatemala Ecuador Panama Mexico Nicaragua	US Belize Honduras Ecuador Costa Rica Brazil Guatemala Ecuador Panama Mexico Nicaragua	Mexico Belize Ecuador Costa Rica Brazil Guatemala Ecuador Panama Nicaragua	Nicaragua Belize Ecuador Costa Rica Brazil Guatemala Ecuador	Nicaragua Belize Ecuador Costa Rica Brazil Guatemala Ecuador Panama
Blackberry	Mexico Chile Guatemala California	Mexico Chile Guatemala California	Mexico Guatemala	Mexico Guatemala	Mexico US	Mexico US	US Canada	US Canada	US	Guatemala Mexico US	Guatemala Chile Mexico US	Guatemala Chile Mexico
Blueberry	Chile Argentina	Chile Argentina	Chile US	Chile US	US Mexico Chile	US Mexico Canada	US Mexico Canada Uruguay	US Mexico Canada	US Mexico Canada Uruguay Argentina	Chile US Canada Uruguay Argentina	Chile US Uruguay Argentina	Chile Uruguay Argentina
Carrot	US Belize Mexico Guatemala Canada	US Belize Mexico Guatemala Canada	US Belize Mexico Guatemala Canada	US Belize Mexico Guatemala Canada	US Belize Mexico Guatemala Canada	US Belize Mexico Guatemala	US Belize Mexico Guatemala Canada	US Belize Mexico Guatemala Canada	US Belize Mexico Guatemala Canada	US Belize Mexico Guatemala Canada	US Belize Mexico Guatemala Canada	US Belize Mexico Guatemala Canada
Celery	US	US	US	US	US	US	US Canada	US Canada	US Canada	US Canada	US	US
Cherry	Chile Argentina			US	US	US Canada	US Canada	US Canada	US	Chile Argentina	Chile Argentina	Chile Argentina
Cranberry				Chile Argentina	Chile Argentina	Chile Argentina			US Canada	US Canada	US Canada	
Grape	Peru Chile US	US Argentina Chile	Chile Argentina	Chile Argentina	Chile US Peru Brazil Argentina	Brazil US Peru	US	US Mexico Canada	US Mexico Canada	US Peru Brazil Canada	US Brazil Peru	Peru Chile US
Grapefruit	US Belize Mexico	US Belize Mexico	US Belize Mexico	US Belize Mexico	US Belize Mexico	US Belize	US Belize	US Belize	US Belize Mexico	US Belize Mexico	US Belize Mexico	US Belize Mexico
Kiwi	US Uruguay Argentina Chile	US Uruguay Argentina Chile	US Uruguay Argentina Chile	US Chile	US	Chile	Chile	Chile	Chile US	US	US Uruguay Argentina Chile	US Uruguay Argentina Chile
Lemon	US Argentina Nicaragua	US Argentina Brazil Nicaragua	US Argentina Nicaragua Brazil	US Argentina Brazil Nicaragua	US Argentina Brazil Nicaragua	US Chile Argentina Nicaragua	US Chile Uruguay Nicaragua Argentina	US Uruguay Nicaragua Argentina	US Nicaragua Argentina	US Nicaragua	US Nicaragua	US Argentina Nicaragua
Lettuce	Mexico US	Mexico US	Mexico US	Mexico US	Mexico US	US Canada	US Canada	US Canada	US Canada	US Mexico Canada	Mexico US	Mexico US
Lime	US Belize Mexico Peru Brazil	US Belize Mexico Peru Brazil	US Belize Mexico Brazil	US Belize Mexico Brazil	US Belize Mexico	US Belize Mexico	US Belize Mexico	US Belize Mexico	US Belize Mexico	US Belize Mexico	US Belize Mexico Peru	US Belize Mexico Peru

Appendix B- harvest schedules (continued)

Orange - Navel	US Belize Mexico	US Belize Mexico	US Belize Mexico	US Belize Mexico Brazil	US Belize Nicaragua Mexico Brazil	US Belize Nicaragua Mexico Brazil	US Belize Chile Uruguay Peru Nicaragua	US Belize Chile Uruguay Peru Nicaragua	US Belize Chile Uruguay Peru Nicaragua	Chile Belize Uruguay Peru Nicaragua	US Belize	US Belize Mexico
Orange - Clementine	US	US		Peru	Peru	Peru Paraguay	Brazil Bolivia Paraguay Chile Peru	Brazil Bolivia Paraguay Chile	Brazil Bolivia Paraguay Chile	US Bolivia Chile Brazil	US Argentina Nicaragua Brazil	US Argentina Nicaragua Brazil
Peach	Chile	Chile		US	US	US	US Canada	US Canada	US Canada	US	US Argentina	Argentina
Pear	Argentina US Chile	Argentina US Chile	Argentina US Chile	Argentina US Chile	Argentina US Chile	Argentina US Chile	US Canada	US Canada	US Canada	US	US	US
Pineapple	US Paraguay Belize Costa Rica	US Paraguay Belize Costa Rica	US Paraguay Belize Costa Rica	US Paraguay Belize Costa Rica	US Paraguay Belize Costa Rica	US Paraguay Belize	US Paraguay Belize	US Paraguay Belize	US Paraguay Belize	US Paraguay Belize	US Paraguay Belize	US Paraguay Belize
Plum	Chile	Chile	Chile	Chile	Chile	US	US	US	US	US		
Potatoes	US Belize Canada	US Belize Canada	US Belize Canada	US Belize Canada	US Belize Canada	US Belize Canada	US Belize Canada	US Belize Canada	US Belize Canada	US Belize Canada	US Belize Canada	US Belize Canada
Raspberry	Chile Mexico California	Chile Mexico California	Chile Mexico California	Chile Mexico California	US	US	US Canada	US Canada	US Canada	US	Chile US	Chile US
Strawberry	US Paraguay Chile Mexico	US Paraguay Chile Mexico	US Paraguay Chile Mexico	US Mexico	US	US Canada	US Canada	US Canada	US Paraguay Argentina	US Paraguay Argentina Mexico	US Paraguay Argentina Chile Mexico	US Paraguay Chile Mexico
Tomatoes	US Belize Mexico	US Belize Mexico	US Belize Mexico	US Belize Mexico	US Belize Mexico	US Brazil Belize Mexico Canada	US Brazil Belize Mexico Canada	US Brazil Belize Mexico Canada	US Brazil Belize Mexico Canada	US Belize Mexico Canada	US Belize Mexico	US Belize Mexico

Appendix C- Seaports

Highest rated ports for perishables:

Pacific Coast, the port of Los Angeles, California

Caribbean, Port Guadeloupe

Here's a quote about the Miami Port (best for shipping perishables in the Gulf)

> *"Geography also seems to favor Miami. The "Cargo Gateway to the Americas" is the closest East Coast port to producers of winter fruits and vegetables in Central and South America. "Miami truly is a natural entry point for perishables"*

East cost, port at Wilmington, Delaware

> *"Wilmington has retained its status as North America's No. 1 seaport for imported perishables, largest U.S. seaport for bananas (second in the world) and the nation's leading port for fruit concentrates"*

Appendix D- Product storage information

Produce Commodity	Days of Shelf Life	Optimum Temperature
Apples	90-240	32
Asparagus	14-21	32
Bananas	7-28	58
Carrots	14-28	32
Celery	10-20	32
Grapefruit	15-25	50
Kiwifruit	10-15	32
Lemons	15-30	50
Lettuce	10-14	32
Limes	15-30	50
Oranges	10-15	45
Pineapples	10-15	50
Potatoes	30-50	50
Strawberries	5-10	32
Tomatoes	7-14	55

Optimum temperatures for storing food

Fresh meats, poultry, dairy products	**24 to 36 degrees Fahrenheit**
Fresh Fish	30 to 24 degrees Fahrenheit
Frozen foods	-10 to 0 degrees Fahrenheit

Note: refrigeration works best if food is already at temperature, not trying to chill it.

Trends indicate that more and more food storage space is going toward the storage of Frozen products.

Shelving requires good air flow and most products must be stacked a minimum of 6 inches of the floor.

Appendix E- Warehouse Management