

## 2020 IM<sup>2</sup>C

### Problem: Flash Sale



The tradition of massive **flash sales** at “**brick and mortar**” retail stores is spreading around the world. Originally these big sales were scheduled in the United States to target consumers at the start of a holiday season and on a day they did not go to work (e.g. Black Friday sales). Now, nearly 20 different countries have some form of flash retail sales in attempts to have consumers shop locally and not go online to purchase products.

During these flash sales, stores advertise huge discounts on sale items, along with expanded operating hours (usually opening very early in the morning), to attract customers hoping these customers will buy more than just the discounted products.

At the start of these sales, numerous eager shoppers gather at the store entrance to rush in at the store’s opening, grab their desired item(s), run to a cashier to quickly make their purchases, and then leave to perhaps travel to another store for more deals. In the process, the over-agitated shoppers are likely to **stampede** and create “human traffic jams,” sometimes hurting each other and damaging the surrounding goods. Additionally, some shoppers may not get an item they want due to the item being sold out when they arrive at the item’s location in the store.

In preparing for the next flash sale, the manager of an electronic and appliance retail store has asked your team for assistance. The manager is planning a store renovation and has the opportunity to reorganize the layout of the store. The store sells a wide variety of products to include televisions of all sizes, as well as small to large electronics (e.g. cell phones, cameras, home theater equipment) and small to large appliances (e.g. coffee makers, vacuum cleaners, washing machines, gas and electric cooking stoves). The manager has provided you a list of store departments and major categories of products offered in the store beginning on page 5, as well as a list of some of the actual items offered during the flash sale to include flash sale pricing, availability, and consumer rating data (See **Attachment**: StoreData\_IMMCC.xls).

The store manager wants to minimize levels of damage to products and believes a store's floor plan and the layout of different departments and categories of products on that floor plan will help to meet these objectives. **Figure 1** provides an example of a possible floor plan. A larger version of the floor plan is on page 7.

## Requirements

### 1. The Event.

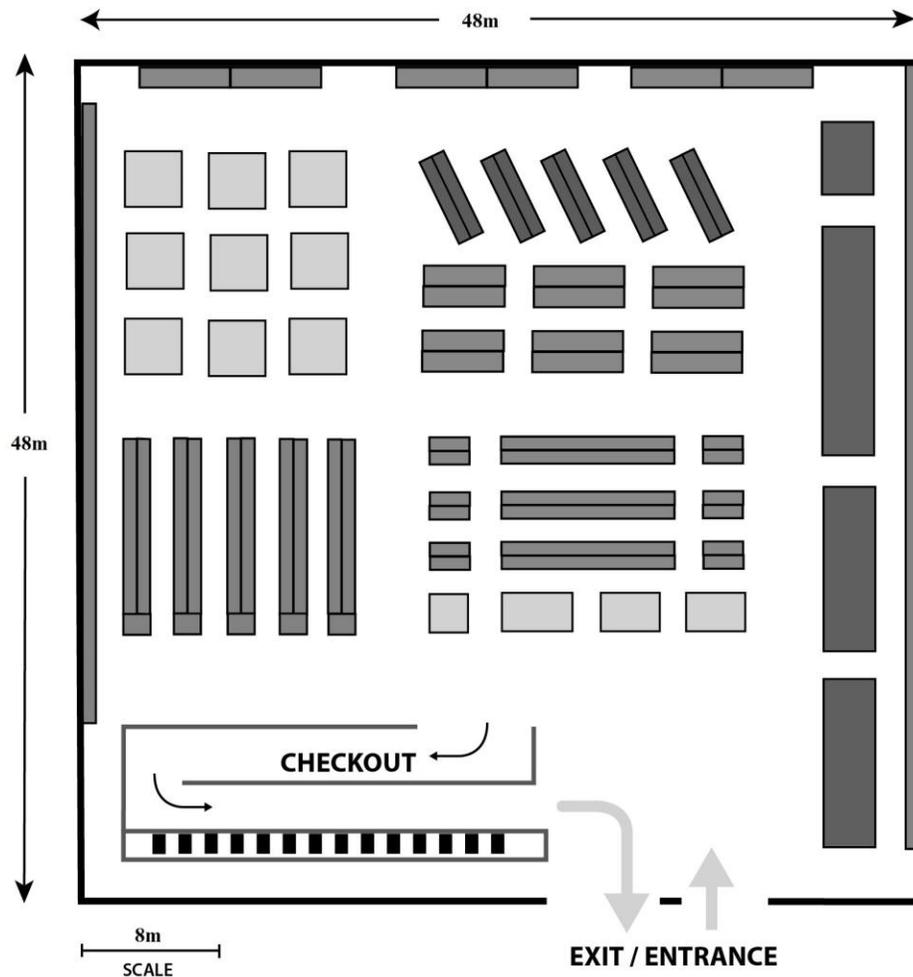
- a. Describe the various ways in which products at the store might be damaged during the sale event due to careless and accidental actions of the customers.
- b. Consider the items included in this flash sale event. Which sale items do you think will be most popular (most desired) by the shoppers and why?

### 2. Store Layout.

- a. Use your responses to Requirement 1 to identify and describe the store layout factors that impact possible damage to products and other measures you deem important during a flash sale event.
- b. Use the factors you identified in part 2.a. to develop a mathematical model or models to quantitatively predict both the behaviors of the flash sale customers that potentially result in damage to products in the store and the level of that damage. Your model(s) should incorporate floor plan characteristics, location of departments, specific flash sale products, and arrangement of cashier stations.
- c. Based on your factors and model, discuss the optimal locations of the store's departments and the most popular/desired sale items. Indicate these locations on the floor plan in **Figure 1**. In other words, label the various areas of the floor plan with your team's choice for the locations of departments and displays of the most popular sale products.
- d. Using your analysis and the model you developed, create and evaluate a new and better floor plan for this flash sale scenario. The store dimensions, scale, location of the entrance/exit, and the items for sale remain the same, but your team can now create its own layout. Justify why your floor plan is better than the one given in **Figure 1**. (Note: Your new floor plan can be hand-drawn or computer created. Include an electronic version or a photo of your floor plan in your submission.)

### 3. Letter.

Write a one-page letter to the store manager supporting your floor plan layout and discussing any additional strategies for a successful flash sale.



**Store Floor Plan**

**Figure 1: Store Floor Plan Layout**

Your submission should consist of:

- One-page Summary Sheet
- Table of Contents
- One page letter to the Store Manager
- Your two floor plan layout diagrams (Requirements 2.c. and 2.d)
- Your solution of no more than 20 pages (A4 or letter size), for a maximum of 25 pages with your summary, table of contents, letter, and floor plans. Note papers must be typed with a readable font of at least 12 point type.

Note: Reference List and any appendices do not count toward the page limit and should appear after your completed solution. You should not make use of unauthorized images and materials whose use is restricted by copyright laws. Ensure you cite the sources for your ideas and the materials used in your report.

## Glossary

**Brick and Mortar:** refers to traditional businesses that have a physical presence in the form of storefronts, warehouses, or factories to offer products and services to its customers face to face.

**Flash Sale:** a type of promotion run for a short time, and featuring specific product(s)/service(s) offered at deeply discounted prices. Another common hallmark of flash sales is a limited quantity of the items up for sale.

**Stampede:** to suddenly start running together in the same direction.

## Attachment

[StoreData\\_IMMCC.xlsx](#)

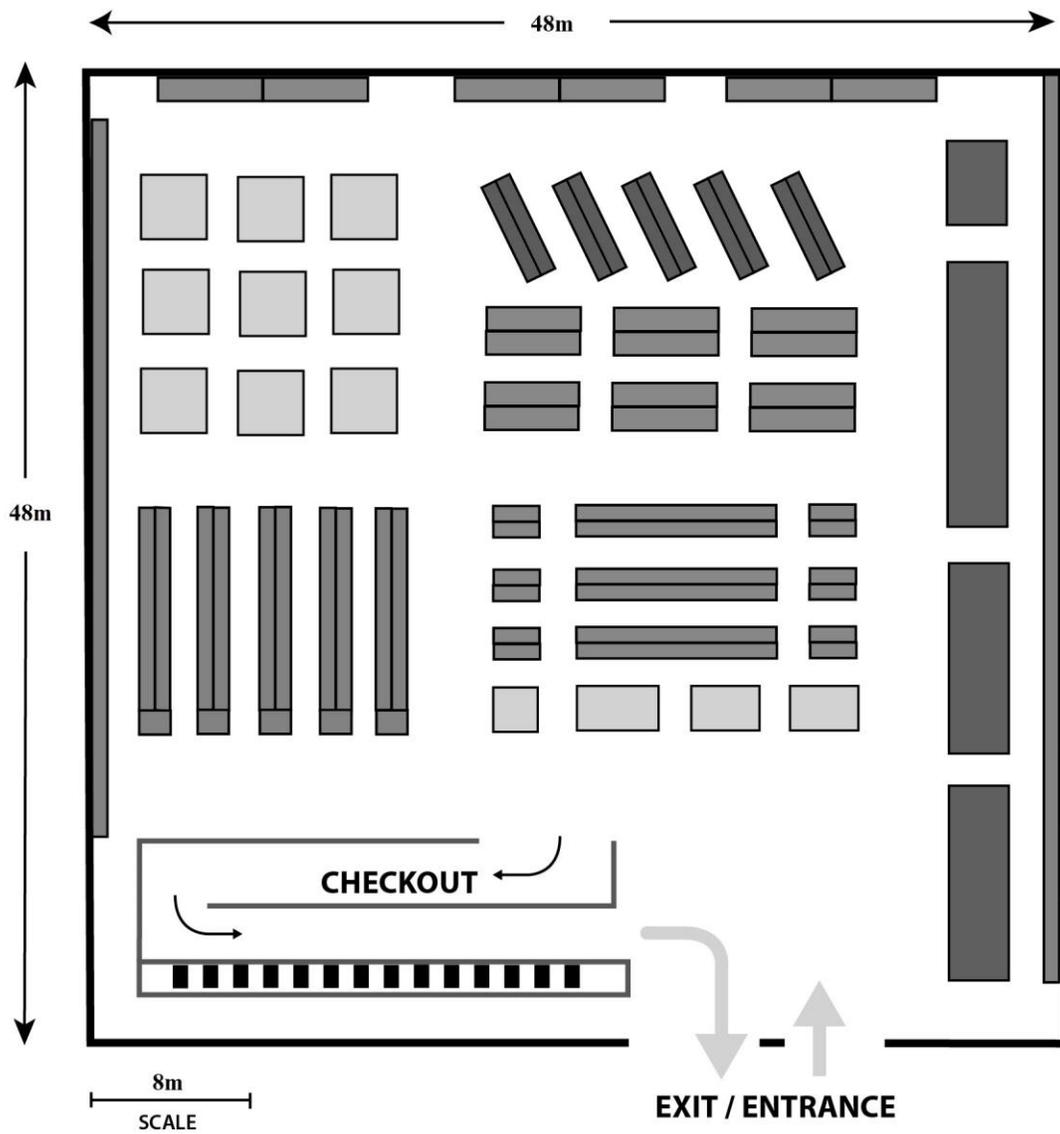
## Data Set/Table of Product Definitions

- Department: a section of a store that includes a grouping of related major product categories.
- Major Product Category: the major consumer category for the product.
- Product Type: a subcategory within the major product category.
- Make (Brand): the manufacturer of the product (e.g. Sony, HP, GE, etc. For the purpose of IMMC we have indicated the makes with “Brand” and a letter code.).
- Product: the actual item for sale with a short description.
- Regular/Suggested Retail Price (USD): the recommended or base retail price of an item in US dollars when not on sale.
- Price During Flash Sale (USD): the price of the item in US dollars during the limited time of the flash sale.
- Quantity Available During Flash Sale: the number of a particular item at the store and available for sale when the flash sale begins.
- Customer Rating (1-5): the average of the overall product satisfaction ratings of the product given by customers who previously purchased the item using a scale of 1 (low rated, low satisfaction) to 5 (highly rated, high satisfaction).

## IMMC ELECTRONICS/APPLIANCE STORE DEPARTMENTS, PRODUCT CATEGORIES, AND PRODUCTS

DEPARTMENT	MAJOR PRODUCT CATEGORY	TYPES OF PRODUCTS
Appliances	Laundry Appliances	Washers, Dryers, Irons, Clothing Steamers, Sewing Machine
	Major Kitchen Appliances	Refrigerators, Freezers, Ranges/Stoves, Dishwashers, Microwaves
	Small Kitchen Appliances	Coffee Makers, Blenders, Mixers, Toasters, Pots/Pans, Slow Cookers, Food Processors
	Vacuum Cleaners & Floor Care	Upright Vacuums, Canister Vacuums, Commercial/Shop Vacuums, Robot Vacuums, Carpet Cleaners, Hand-held and Stick Vacuums, Steam Mops
	Heating, Cooling, & Air Quality	Heaters, Air Conditioners, Fans, Humidifiers, Dehumidifiers, Air Purifiers, Thermostats
Audio	Headphones	Over-the-Ear, On-the-Ear, Earbuds and in-ear, Wireless, Noise Cancelling, Sports, Gaming Headsets, Accessories
	Car Audio	Receivers, Speakers, Subwoofers and Enclosures, Amplifiers, Device Connectors, Satellite Radios, Accessories
	Docks, Radios and Boomboxes	Boomboxes, CD and Cassette Players, Radios, Stereo Shelf Systems, Speaker Docks
	iPod and MP3 Players	Devices, Accessories
	Speakers	Bluetooth and Wireless, Wired, Bookshelf, Floor, In-Wall and In-Ceiling, Speaker Systems, Portable Speakers, Smart Speakers, Water-Resistant Speakers, Speaker Accessories
	Cameras	DSLR Cameras
Mirrorless Cameras		Package Deals, 4K Mirrorless, Wi-Fi Mirrorless, Full Frame Mirrorless, Lenses, Accessories
Point and Shoot Cameras		Waterproof, Wi-Fi, Long Zoom, Premium, Instant, Accessories
Camcorder		Traditional 4K Camcorder, Wi-Fi Camcorder, Action Camcorders, 360 Degree Cameras, Camcorder Accessories
Drones		Camera Drones, Drone Accessories
Camera Accessories		Memory Cards, Lenses and Caps and Filters, Lends Adaptors, Tripods and Monopods, Flashes and Lighting, Bags and Cases, Batteries and Chargers, Remote Controls, Cleaning Equipment
Cell Phones		Cell Phones and Accessories

<b>DEPARTMENT</b>	<b>MAJOR PRODUCT CATEGORY</b>	<b>TYPES OF PRODUCTS</b>
Computers & Tablets	Desktops and All-In-Ones	Desktop Packages, All-in-One Computers, Towers, Gaming Desktops
	Laptops	2-in-1s, PC and Mac Laptops, Chromebooks, Gaming Laptops, Laptop Accessories
	Tablets	2-in-1s, Kid's tablets, E-readers, iPads, Tablet Accessories
	Monitors	LCD, LED, IPS, Gaming Monitors
	Printers, Ink and Toner	3D Printers and Filament, All-in-One Printers, Inkjet Printers, Laser Printers, Photo Printers, Ink and Toner
	Cards and Components	GPU/Video Graphic Cards, CPUs/Processors, Motherboards, Power Supplies, Memory/RAM, Networking and Wireless
	Hard Drives and Storage	External Hard Drives, Internal Hard Drives, Solid State Drives, USB Flash Drives, NAS/Personal Cloud Storage
TV & Home Theater	TVs	4K Ultra HD TVs, Smart TVs, Outdoor TVs, OLED TVs, 8K TVs, Projectors and Screens
	Video	Blu-Ray Players, DVD Players, 4K Ultra HD Upscaling Players, Portable DVD Players, Streaming Media Players, Streaming Blu-Ray Players, DVRs, 4K UHD Streaming Video Players
	Audio	Home Theater Systems, Sound Bars, Speakers, Receivers and Amplifiers, Stereo Shelf Systems, Wireless and Multiroom Audio, CD Players and Turntables, Headphones
	TV and Home Theater Accessories	TV Antennas, HDMI Cables, A/V Cables and Connectors, Remote Controls, A/V Surge Protectors and Power, Home Theater Networking, A/V Switches, 3D Accessories
Video Gaming	Console Game Systems	Consoles, Games, Controllers, Accessories (headsets, chairs, etc.), Gift Cards, e-shops
	PC Gaming	PC Games, Gaming Desktops and Laptops and Monitors, Accessories (headsets, hard drives, etc.), Computer Cards and Component, Virtual Reality



**Store Floor Plan**