# SDM Big Mart Sales:

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| --- | --- | --- |
| Variable | Effect | Rationale |
| Item\_Fat\_Content | +/- | Customers (Health conscious) have specific preferences for (low fat) fat levels products. |
| Item\_Visibility | + | The more the product is visible, the probability of getting sold is more. |
| Item\_Type | +/- | Few types of products are fast moving when compared to other. |
| Item\_MRP | - | People usually prefer lower prized product within same category. |
| Outlet\_ID | ? | Few Outlets have better sales depending upon its accessibility or some other popularity |
| Outlet\_Year | + | Older the outlet more is the regular customer base thus more sales. |
| Outlet\_type | +/- | Bigger the store more are the available products |
| City\_Type | + | Larger the city more is the population, thus we can expect more sales. |
| Excluded Variables | | |
| Item\_ID | 0 | No effect on sales |
| Item\_Weight | 0 | No much effect, depends in type of product and price (1463 missing values) |
| Outlet\_size | 0 | Already considered in Outlet type variables (2410missing values) |

# Chart, histogram Description automatically generated

The dependent variable “Item\_sales” is highly skewed, thus will be considering log. We have multi-level data: Item level, Outlet level, and city level.

I will be adding all the main effects that I have discussed in the predictor table and build multilevel models, Fixed effect, and Random effect.

* Tier 2 city has slightly higher median sales than Tier3 and Tier 1 has lowest.
* Supermarket model 3, 1 ,2 and Grocery stores, in this decreasing order the sales vary.
* Seafood has the highest median sales and baking goods have the lowest median sales in the data

![A sheet of music

Description automatically generated with medium confidence]()

**Models:**

**sales.model2**= lm(log(Item\_Sales) ~Item\_Fat\_Content+Item\_Visibility+Item\_Type+Item\_MRP+Outlet\_Year+Outlet\_Type+City\_Type+Outlet\_ID)

**sales.model3=** lmer(log(Item\_Sales) ~Item\_Fat\_Content+Item\_Visibility+Item\_Type+Item\_MRP+Outlet\_Year+Outlet\_Type+City\_Type+(1|Outlet\_ID), data=sales\_data, REML=FALSE)

**sales.model4**= lmer(log(Item\_Sales) ~Item\_Fat\_Content+Item\_Visibility+Item\_Type+Item\_MRP+Outlet\_Year+Outlet\_Type+(1|City\_Type/Outlet\_ID), data=sales\_data, REML=FALSE)

stargazer(sales.model1, sales.model2, sales.model3, type="text", single.row=TRUE)

Table

Description automatically generated

**GVIF Df GVIF^(1/(2\*Df))**

**Item\_Fat\_Content 1.219320 2 1.050823 Model passes multicollinearity test**

**Item\_Visibility 1.067206 1 1.033056**

**Item\_Type 1.245115 15 1.007334**

**Item\_MRP 1.012839 1 1.006399**

**Outlet\_Year 4.436647 1 2.106335**

**Outlet\_Type 6.853702 3 1.378227**

**City\_Type 4.261489 2 1.436780**

**sales.model2 and sales.model3** are 2 level ,fixed and random effects models respectively and **sales.model4** is another random effects models with 3 levels explaining all the factors required. I will be considering the random effects **sales.model3** with better AICto provide my interpretations.

What type of outlet will return him the best sales: Grocery store or Supermarket Type 1, 2, or 3.  
**Ans:** Supermarket Type 3 has the best sales compared all other types, with 250% more sales than Grocery store, 57.5% more sales than Supermarket Type 1 and 75.3% more than Supermarket Type2

What type of city will return him the best sales: Tier 1, 2 or 3?  
**Ans:** Tier 1 City has better sales than Tier2 and Tier3 cities by 1.6% and 3.3% respectively.

What are the top 3 highest performing and lowest performing stores in the sample?  
**Ans:** The top 3 performing stores are OUT35(+0.019%), OUT049 (+0.007%), OUT017 (+0.005%).  
The bottom 3 performing stores are OUT045 (-0.025%), OUT046 (-0.011%), OUT010 (-0.003%)

**Actionable recommendations:**

* Opening a Supermarket Type 3 in a Tier 1 city would be the best decision given a huge increase in overall sales compared to others.
* Items under Bread, Canned and Meat categories can yield in better sales, so the supermarket can focus on those items.