DAO2702 – Programming for Business Analytics

BestElect Digitisation Plan

Tutorial Group: TA13

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1.0 Introduction

1.1 Background

Covid-19 is a respiratory illness that started in Wuhan City, Hubei Province (WHO, 2020). On 12 March 2020, the World Health Organization (WHO) declared it to be a global pandemic due to its worldwide spread as well as thousands of deaths reported globally (McKeever, 2020). As a result, numerous countries and cities have gone into lockdown and have implemented several measures to curb the spread. Due to the uncertainty and the lethality of this virus, people are unwilling to leave their homes unnecessarily.

BestElect is a leader in the consumer electronics industry in the USA, selling goods ranging from phone covers to computers and games. They serve an average of 5 million customers monthly. Furthermore, they own 100 brick-and-mortar stores nationwide, with 10 warehouses in different states.

1.2 Business Problem Description

Due to the current Covid-19 pandemic, BestElect has hired us (a Consulting firm – SW Partners) to help improve their business. Due to the current government measures imposed, they are experiencing a significant dip in sales as they are required to close most of their stores during this period.

In today's digital age, the growing prevalence of online e-commerce retail stores (Hatch, 2020), have made consumer shopping at brick-and-mortar stores much less lucrative (Richter, 2018). Hence, our team has decided to explore the benefits for BestElect to sell their goods on an e-commerce platform as well as developing an online mobile application. Using Amazon as a base for our study, we will also recommend what products the firm should focus on selling on its e-commerce platforms. Lastly, we will be coming up with a long-term growth plan for the firm as well.

2.0 Adopting an E-Commerce Platform

Firstly, it is imperative that BestElect explores alternatives to operating their business due to the fall in consumer shopping at brick-and-mortar stores due to the Covid-19 pandemic. They could consider building an e-commerce platform to sell their electronic products. An e-commerce platform enables BestElect to sell their products beyond the USA since anyone from any country can access their store at any time. It also allows them to acquire new customers as they will be visible on search engine platforms, and customers might end up on their site after looking into a product they are interested in. The company can also save costs by not having to hire employees and rent retail outlets to sell their goods at, shipping goods directly to the customers instead (Khurana, 2019).

2.1 Analysis of E-commerce dataset

To analyse if having an e-commerce platform does generate more revenue from customers, our team decided to analyse a dataset taken from a clothing company, FashionForward, in the USA which contains the data of its customers: their time in-store, time on the store's mobile platform as well as their yearly amount spent on FashionForward's products (Kolawale, 2019). Our team aims to analyse the value of yearly amount spent by a customer based on two variables: the in-store session length and the time spent on the store's mobile app and determine if having a mobile app does stimulate consumer spending and in turn bring in more revenue.

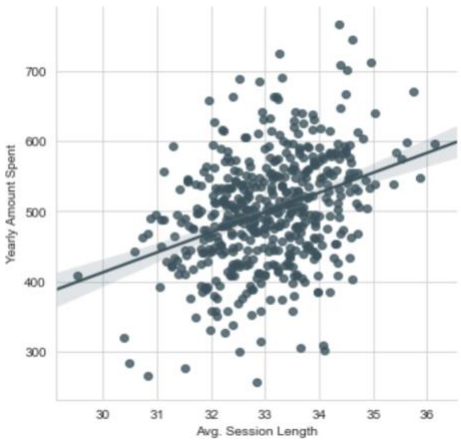

Figure 1: Avg. Session Length (in-store) vs Yearly Amount Spent

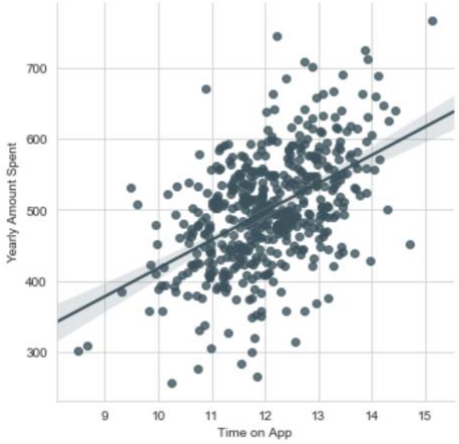

Figure 2: Time on Mobile App vs Yearly Amount Spent

As shown in Figure 1 and Figure 2, both the length of the customers' session in-store and time on the mobile app correlate positively with their amount spent yearly. The Pearson's correlation coefficient (r-value) for the correlation between customer's session in-store and amount spent annually is equal to **0.355** and that between the customer's time on app and amount spent yearly is equal to **0.499**, indicating moderate positive correlations between the variables and the yearly amount spent.

We then use a linear regression model (scikitlearn, 2020) to predict the value of the amount spent yearly by a customer based on his or her time on the mobile app and their in-store session length. The model performed with an r-square value of **0.989**, which indicates that the model fits well onto the data. The coefficients for each independent variable are shown in Figure 3:

	Coeffecient
Avg. Session Length	25.981550
Time on App	38.590159
Time on Website	0.190405
Length of Membership	61.279097

Figure 3: Coefficients of each independent variable

This means that holding all other variables fixed, a 1 unit increase in Avg. Session Length is associated with an increase of $25.98 spent, while a 1 unit increase in Time on App is related to an increase of $38.59 spent by the customer.

From the results, it can be seen that the mobile app stimulates more spending from its customers compared to the retail store. By building a mobile app for its customers, FashionForward was able to generate more revenue from its customers. Similarly, BestElect should consider investing efforts into adopting an e-commerce platform and developing a mobile app to stimulate consumer spending and generate more revenue on its products.

It should also be noted that the length of customer membership boosts the most spending for FashionForward. This suggests that BestElect could consider looking into creating a subscription-based service for tech-savvy customers, such as tech subscription boxes (Matthews, 2019).

However, there are a few critical assumptions regarding the data. Firstly, the dataset was based on an e-commerce platform for a clothing company, and the results can differ when applying this strategy to an electronics company such as BestElect. Secondly, the data is limited to one clothing store and hence might not be representative of all clothing stores. Nonetheless, online shopping has been slowly growing over the years, from 6.4% to 16.0% of US total retail spend from 2010 to 2019 (Young, 2020), and by participating in e-commerce, BestElect could see their retail spend grow as well.

3.0 New Product Line

In addition, we propose to introduce a new product line for BestElect. It is vital for businesses to continue improving their product line to meet the customer's needs and wants to retain and attract new customers. Thus, we plan to introduce 3 new products for BestElect to add to their product mix.

3.1 Analysis of Amazon Product Reviews

To find out which electronic products are of high demand and profitability, we analysed a dataset with Amazon reviewed products, consisting of products such as Fire TV sticks and Kindle. The main reason for choosing to sell Amazon products is due to their strong reputation, allowing for greater publicity. We decided to analyse the products based on their ratings and pick out the products that have the highest percentage of positive reviews (best-selling).

	rating 4 and above	rating 3 and below
Fire Tablet, 7 Display, Wi-Fi, 8 GB - Includes Special Offers, Magenta	9938	1024
Echo (White),,\r\nEcho (White),,	3126	183
Amazon Kindle Paperwhite - eBook reader - 4 GB - 6 monochrome Paperwhite - touchscreen - Wi-Fi - black,,	3079	97
All-New Fire HD 8 Tablet, 8 HD Display, Wi-Fi, 16 GB - Includes Special Offers, Magenta	2667	147
Amazon Fire Tv,,\r\nAmazon Fire Tv,,	2397	130
Fire Kids Edition Tablet, 7 Display, Wi-Fi, 16 GB, Green Kid-Proof Case	1529	156
Brand New Amazon Kindle Fire 16gb 7 Ips Display Tablet Wifi 16 Gb Blue,,	960	73
Kindle Voyage E-reader, 6 High-Resolution Display (300 ppi) with Adaptive Built-in Light, PagePress Sensors, Wi-Fi - Includes Special Offers,	562	18
Fire Tablet, 7 Display, Wi-Fi, 8 GB - Includes Special Offers, Black	348	20
Amazon - Amazon Tap Portable Bluetooth and Wi-Fi Speaker - Black,,,\r\nAmazon - Amazon Tap Portable Bluetooth and Wi-Fi Speaker - Black,,,	304	14

Figure 4: Top 10 Amazon most reviewed products

As shown in the figure above, we have categorized the products into two separate classes of ratings with rating 4 and above to be 'Good' and rating 3 and below to be 'Bad'.

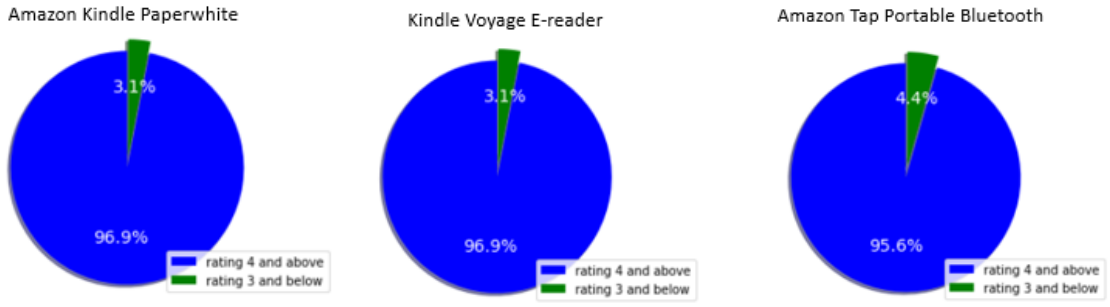

Figure 5: Amazon top 3 products with highest percentage of positive reviews

Amongst the 10 most reviewed products, we have found 3 main products that BestElect should sell. As shown in Figure 5, these products have the highest percentage of 'good' review as compared to the other Amazon products.

Hence, we propose for BestElect to introduce these 3 products to be added on their website:

1. Kindle Voyage E-reader, 6 High- Resolution Display (300 ppi) with Adaptive built in light, PagePress Sensors, Wifi (with 96.9% good ratings)
2. Amazon Kindle Paperwhite - eBook reader - 4 GB - 6 monochrome Paperwhite - touchscreen - Wi-Fi - black (with 96.9% good ratings)
3. Amazon - Amazon Tap Portable Bluetooth and Wi-Fi Speaker - Black (with 95.6% good ratings)

4.0 Business Strategies and Consumer Retention Strategies

As of 2014, the E-Commerce market is rather saturated with over 12 to 25 million stores running worldwide (Bhalla, 2014). For BestElect to make a smooth integration into digitization and remain competitive in the current market conditions, we identified that consumer conversion and growth strategies are crucial.

4.1 Conversion Rate Optimization

Conversion rate is defined as the number of conversions divided by the total number of visitors for a given webpage or application. Conversion rate optimization is essential because it allows one to lower customer acquisition costs by getting more value from the visitors and users they already have (IFP, 2017). For our analysis, we used a data set which details the intention of online shoppers with 12330 unique entries. This data set studies various factors which could lead to the successful conversion of online traffic (Sakar & Kastro, 2019). We define sales gain as the action of a customer visiting the site and purchasing something and sales lost when a customer visits a site and leaves without buying anything. From Figure 6, we see that the percentage of sales lost is exceptionally high which signals to us that conversion rates are bad.

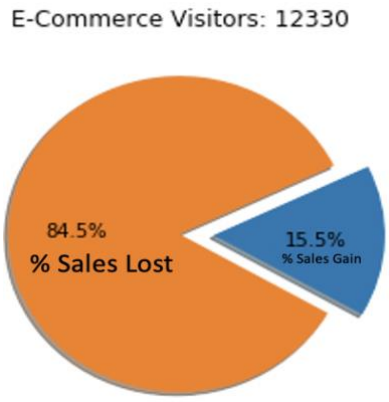

Figure 6: Percentage of E-Commerce website visitors that becomes customers

Hence, it is crucial to make the app more sticky. Making the application stickier includes increasing users' time spent and frequency of use of the application. We can use strategies such as making our application's UI/UX more user-friendly and sticky by experimenting with effective layouts, contents, and functional pages (Optimizely, n.d). In addition, according to a study done, design expectations fit, ease of use and design aesthetics all affect the consumer's decision on whether to continue using the application (Lowry et al, 2015). We did a study to see how the effect of the number of clicks on an e-commerce webpage correlates to the amount of money spent:

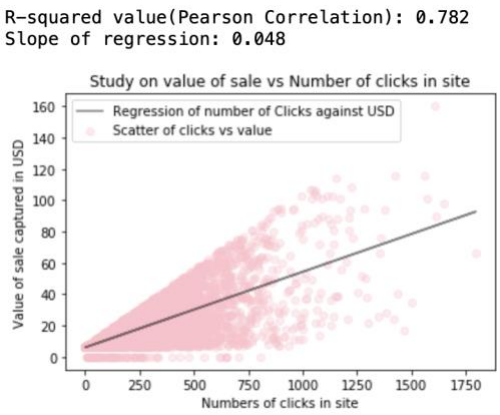

Figure 7: Correlation of Number of clicks in site with value of sale captured in USD

With reference to the linear regression in Figure 7, there is a moderately strong linear relationship between clicks in site and USD captured. Hence our strategy of making the application more sticky holds, showing that with every click on our application, it would translate to 0.048 USD captured in revenue.

To further determine how our traffic spends their time on E-commerce platforms, we would want to look at the time spent in each segment of the website to gain insights on which areas of the application we should focus on. We can see from Figure 8 that most of the time spent is on Product Related duration, followed by Administrative Duration and lastly Informational Duration. We define Administrative duration as time spent on dealing with things such as member logins, navigating promotions, settings and payments. For information duration, we define it as time spent reading terms and conditions. We derive that for more successful traffic conversion, we should make the app more sticky in regards to product and admin duration.

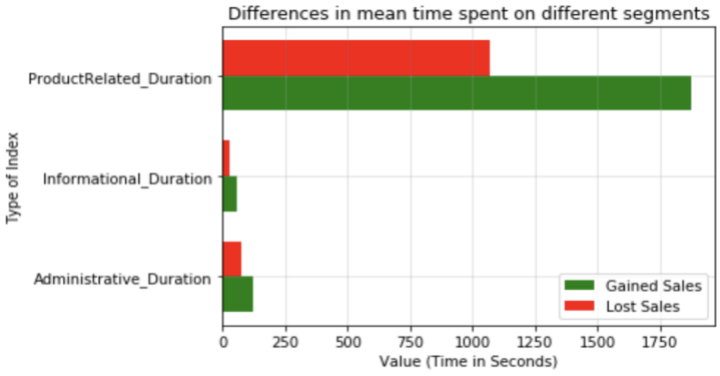

Figure 8: The mean values of time spent in different segments of the E-Commerce platform

A suggestion to improve time spent in product duration is to use video demonstrations as it can boost consumer confidence about a particular product (Savage, 2017). Having many payment options is also crucial to avoid a situation in which the customer wants to make a purchase but can't (Quicksprout, 2019).

We can see that for each duration, time spent is significantly higher for gained sales and we were curious if there is any relationship between time spent and conversion rates. We further our study using logistic regression to see what values of time spent on different segments in Figure 8 would enable us to have a higher probability of conversion.

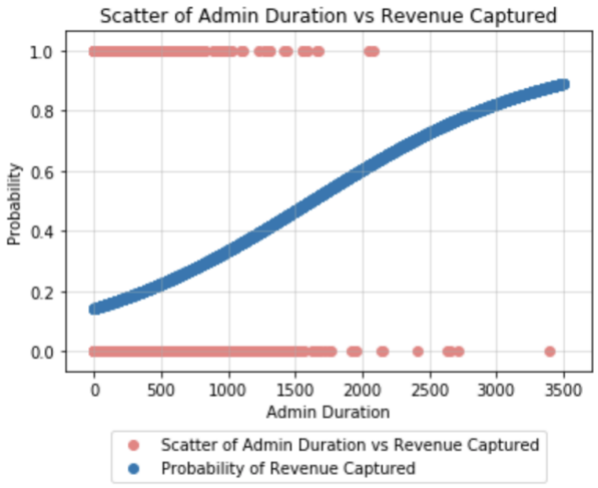

Figure 9: Regression of Admin vs Revenue

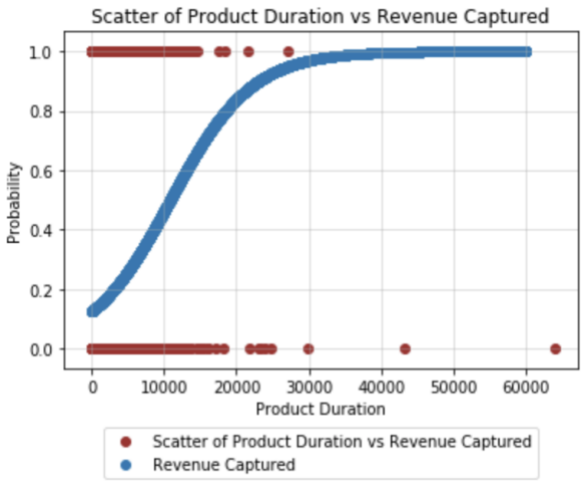

Figure 10: Regression of Product vs Revenue

We can see from Figure 9 and 10 that solely focusing on product duration is not enough. By influencing the time spent on admin duration, we can increase the probability of successful conversion by approximately 80%, if our traffic spends about 3500 seconds on it. This shows us that utilising strategies such as thinking of new and creative ways to market e-commerce products and services could have positive effects on sales. Running promotional campaigns and having solid membership benefits can boost consumer loyalty and brand equity as well (Pompa, 2020).

4.2 Marketing Platform Strategies

To stay relevant, we have to promote our brand actively. To gain insights on how social media affects the chances of consumers being influenced to purchase something online, we did a simple visualisation using the data set provided by Whatsgoodly, which boasts an active user base of 300,000 millennials and Gen Z members. This data studies 2,676 millennials and identifies which social media platform is most influential to them. We can see from Figure 11 that the two most influential social media platforms when it comes to social media marketing is Instagram and Facebook. In order to optimise the effectiveness of our social media marketing campaign, we should focus on Instagram and Facebook since it yields the highest results. If we observe deeper and compare genders in Figure 12, we can see that Instagram is much more influential when it comes to females. This means that when promoting female-centric products, our main marketing efforts should focus on Instagram. Campaigns like Mother's Day, International Women's Day should be broadcasted using Instagram rather than Facebook.

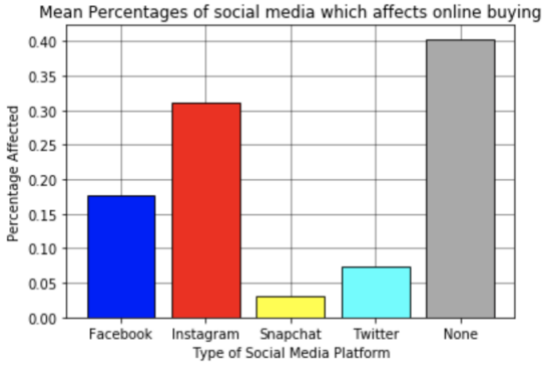

Figure 11: Mean percentages of influences

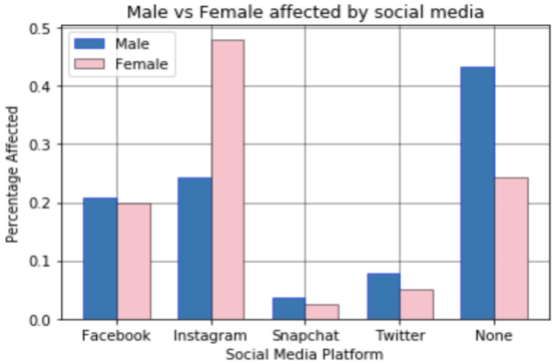

Figure 12: Mean values broken into gender

4.3 Pricing Strategy

Next up, we analysed the trends of prices of electronic products to understand how competitors decided to price their products (offering discounts, promotions). We decided to look at the discounts for electronic products for each month to determine what kind of pricing strategies BestElect should adopt.

To analyse the trend, we used a dataset consisting of electronic products and pricing data to compare the discount trend of different companies utilising e-commerce platforms (Walmart, Amazon, Bestbuy etc.) across the 12 months.

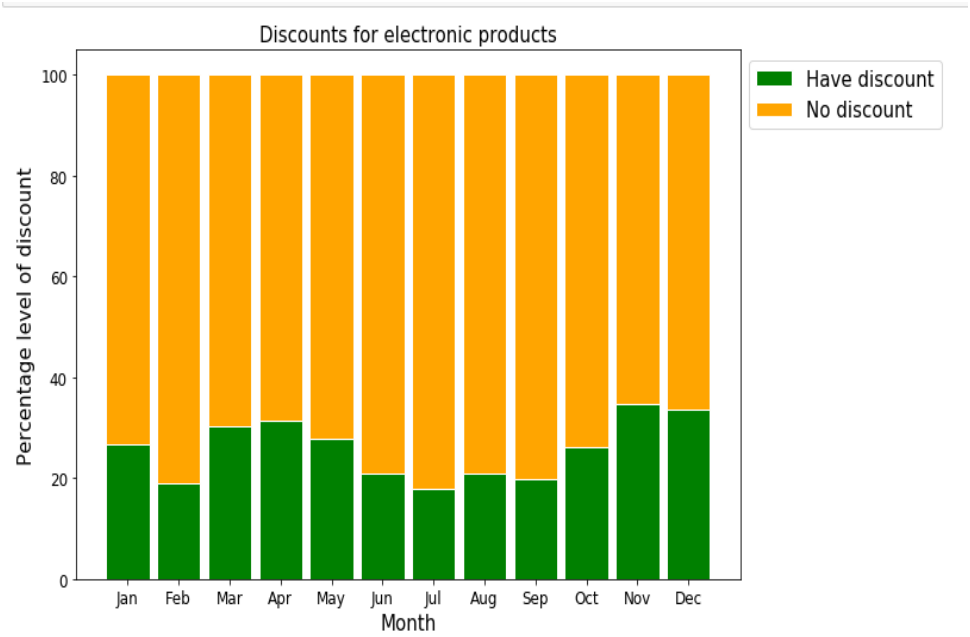

Figure 13: Discounts for electronic products throughout the month

As shown from the figure above, products seemed to be priced at a discounted rate more during the end of the year (Nov and Dec), which can be attributed to the 'Back to School Season' and lowest during July and February.

Thus, BestElect should focus on giving discounts and promotions during the months where discount rates are the lowest amongst competitors to avoid a price war, which may prove to be detrimental to both BestElect and their competitors. Thus, we propose for BestElect to focus on promotion/discount strategies during July and February.

4.4 Competitors

Furthermore, we analysed the number of sales of the different companies to compare their performance and to find out BestElect's strongest competitors.

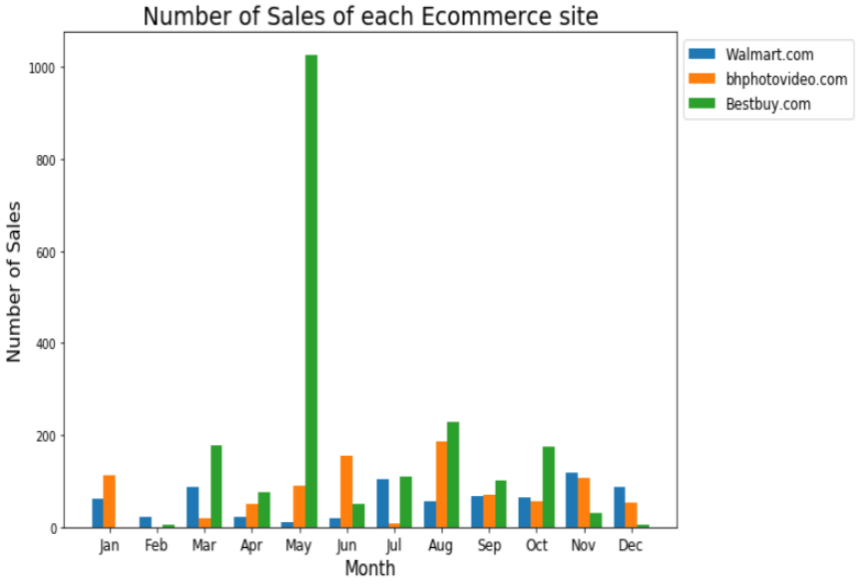

Figure 14: Number of sales of each e-commerce Site

According to Figure 14, it can be seen that Best Buy generally has better sales compared to the other stores. Our team then went to research on the reasons behind Best Buy's higher sales level, hoping to provide a similar or improved business strategy. We found out that in addition to their strong positioning in the market, the company also offers tech support and advice that is superior compared to other companies. Best Buy now has 600 in-home tech advisers who make house calls to advise customers on tech purchases and solutions (Verdon, 2019). Hence, improvement of tech service and advice is one key aspect that BestElect should focus on to sell their products more effectively.

Learning from Best Buy, BestElect can also use their physical stores to their advantage instead of thinking of it as a liability (Verdon, 2019). While physical stores might not be useful currently, BestElect should not shut them down and switch fully to e-commerce. This is because they can use their physical store as a logistical and service hub in the future which will help them in gaining sales and retaining customers in the same way it worked for Best Buy.

5.0 Conclusion

As evident from the various datasets, we understood the importance of e-commerce in modern society, new products for BestElect to introduce and different business growth strategies that BestElect should consider adopting. For the company to overcome this period of uncertainty, we believe the implementation of these measures to be crucial in the improvement of brand equity and sustaining of long-term profits.

6.0 Appendix

6.1 Model Limitations: E-Commerce Platform

Linear regression assumes that there is a straight-line relationship between the dependent and independent variables. However, in a practical scenario, data is rarely linearly separable. Linear regression is also sensitive to outliers, and they should be removed before regression is applied to the data.

6.2 Dataset Limitations: Electronic Pricing Report

The electronic product pricing dataset consists of a list of over 15,000 electronic products with pricing information. However, due to it being a sample of a larger dataset, there might be missing data that could contribute to a change in the results as shown above. Furthermore, some of the data may have missing 'dates of sales', which have to be excluded from the results. Thus, the exclusion of these data points may contribute to a different result; for example, BestBuy sales may not be highest. Additionally, the dataset was updated 2 years ago, and thus the data provided may not be as relevant to account for the trends in prices and business strategies in current times. Hence, in the future, it would be better to perform data mining to obtain the most relevant information to understand the pricing trend more effectively.

6.3 Model Limitations: Logistic Regression

A disadvantage of logistic regression is that we cannot solve nonlinear problems. Furthermore, based on the regression model done, we can see that the logistic regression model is not a perfect fit, and with considerable outliers in the dataset, we might run into errors. Hence, we could also consider other forms of better analyses.

6.4 Dataset Limitations: Social Influence on Shopping

We used a data set provided by Adam Halper on the survey of 2,676 millennials on what were the social platforms that influenced online shopping the most. The data was a primary source collected by Whatsgoodly, which boasts a user base of 300,000 millennial and Gen Z members. However, it only studies millennials and might have a different effect on different age demographics. Hence, if possible, we should mine primary data for the most accurate analysis.

6.5 Dataset Limitations: Purchase Data Analysis

In order to find out what are the patterns associated with purchases on e-commerce sites, we also used the data set provided by Babar Ali which studied whether variables such as time on site, clicks in site affected the revenue captured. However, the source of the data is unknown, which would affect the actual understanding of the underlying population's behaviour.

7.0 References (APA)

Ali, R. B. (2019, December 19). E commerce Purchase Dataset. Retrieved May 4, 2020, from https://www.kaggle.com/raosuny/e-commerce-purchase-dataset

Halper, A. (2017, May 19). Social Influence on Shopping - dataset by ahalps. Retrieved May 4, 2020, from https://data.world/ahalps/social-influence-on-shopping

Hatch, C. (2020, March 11). Be in the Know: Ecommerce Statistics You Should Know. Retrieved May 4, 2020, from https://www.disruptiveadvertising.com/ppc/ecommerce/2018-ecommerce-statistics/

How to Improve Conversion Rates. (n.d.). Retrieved May 4, 2020, from https://www.optimizely.com/optimization-glossary/improve-conversion-rates/

Inglis, E. (2016, September 14). How to Take Your eCommerce Business from $0 to $1 Million. Retrieved May 4, 2020, from https://www.buyapowa.com/blog/take-e-commerce-business-0-1-million/

Khurana, A. (2019, November 20). Why E-commerce Is Taking the Retail World by Storm. Retrieved May 4, 2020, from https://www.thebalancesmb.com/advantages-of-ecommerce-1141610

Kolawale, S. (2019, September 16). Linear Regression E-commerce Dataset. Retrieved May 4, 2020, from https://www.kaggle.com/kolawale/focusing-on-mobile-app-or-website

Lowry, P.B., Gaskin, J. and Moody, G.D. (2015). “Proposing the multi-motive information systems continuance model (MISC) to better explain end-user system evaluations and continuance intentions”, Journal of the Association for Information Systems, Vol. 16 No. 7, pp. 515-579.

Matthews, K. (2020, March 12). 5 tech subscription boxes to get your hands on in 2019. Retrieved May 4, 2020, from https://knowtechie.com/5-great-tech-subscription-boxes-2019/

McKeever, A. (2020, March 11). Coronavirus is officially a pandemic. Here's why that matters. Retrieved May 4, 2020, from https://www.nationalgeographic.com/science/2020/02/how-coronavirus-could-become-pandemic-and-why-it-matters/

Pompa, M. (2020, April 1). How to Increase Ecommerce Sales: 10 Tactics From 53 Experts (2018). Retrieved May 4, 2020, from https://www.bigcommerce.com/blog/increase-ecommerce-sales/#tactics-to-improve-ecommerce-sales

Professionals, M. I. for. (2017, November 15). 6 Reasons Why You Should Care About Conversion Rates. Retrieved May 4, 2020, from https://www.insightsforprofessionals.com/marketing/leadership/reasons-why-you-should-care-about-conversion-rates

Richter, W. (2018, May 19). Here's which brick-and-mortar retailers are getting hit the hardest. Retrieved May 4, 2020, from https://www.businessinsider.com/brick-and-mortar-retailers-getting-hit-the-hardest-2018-5?IR=T

Savage, J. (2017, November 30). 6 Benefits of Product Demo Videos (With 3 Case Studies). Retrieved May 4, 2020, from https://boldcontentvideo.com/2015/11/30/6-benefits-of-product-demo-videos-with-3-case-studies

Sharma, R. (2019, May 23). Online Shopper's Intention. Retrieved May 4, 2020, from https://www.kaggle.com/roshansharma/online-shoppers-intention

sklearn.linear_model.LinearRegression (n.d.). Retrieved May 4, 2020, from https://scikit-learn.org/stable/modules/generated/sklearn.linear_model.LinearRegression.html

WHO Timeline - COVID-19. (2020, April 27). Retrieved May 4, 2020, from https://www.who.int/news-room/detail/08-04-2020-who-timeline---covid-19

Young, J. (2020, February 19). US ecommerce sales grow 14.9% in 2019. Retrieved May 4, 2020, from https://www.digitalcommerce360.com/article/us-ecommerce-sales/

Yaqoob, N. (2019, January 7). 11 Hacks to Increase Visitors' Average Time Spent on Site. Retrieved May 4, 2020, from https://optinmonster.com/11-hacks-to-keep-visitors-on-your-pages-longer/