

ELECTRONIDEX ANALYSIS FOR POTENTIAL ACQUISITION

Date: 05.01.2019

Compiled by: Florian Unger, Deniz Minican, Jorma Laiapea)

Goal:

Primary goal of this analysis is to understand Electronidex customers buying patterns and evaluate potential benefits of acquiring Electronidex.

TL;DR (Exec Summary)

The analysis is based on historical purchase history of Electronidex customers and overview of Electronidex product portfolio.

Electronidex and Blackwell product portfolios are complementary to each other so combining two companies would create additional cross sell opportunities for both companies. Electronidex customers could benefit from Blackwells extended warranty, game console, smartphone and software offerings and Blackwell portfolio would benefit from adding wider variety of displays, PC-s and various accessories.

Based on our understanding Blackwell customers are currently consumers only whereas Electronidex has 88% of their sales volume (in products sold) from Business customer base therefore acquiring ElectrodeX would widen Blackwell customer base.

Also as Electronidex has shown high sales volumes for higher value products (9 out of top 15 products are PC-s and Laptops) then incorporating this know-how to Blackwell would further maximise the revenues from Blackwell's existing customer base.

Electronidex is an online only retailer and based on market basket analysis has high level of online cross sell competence, resulting on average 4.383 items per purchase, which would benefit Blackwell online offering.

Electronidex being only online retailer means that there is limited overhead so acquiring them would increase operational efficiencies.

The association between products that we have analyzed were for the general purpose of business intelligence. Further analysis can be done for specific purposes such as **inventory management** (i.e. pushing high-inventory items) or **increasing overall profitability** (promoting high profit items).

Based on product portfolio and customer purchase history it would be beneficial for Blackwell to acquire Electronidex. Additional analysis on profitability is though recommended.

Electronidex is very successful in cross-selling for B2B sales but not for B2C sales. KPIs can be defined for increasing the items per transaction, focusing on complementary items for B2C and high-value items for B2B.

LONG VERSION

1. Approach

To accomplish the set goal we had to understand and prepare provided data sets.

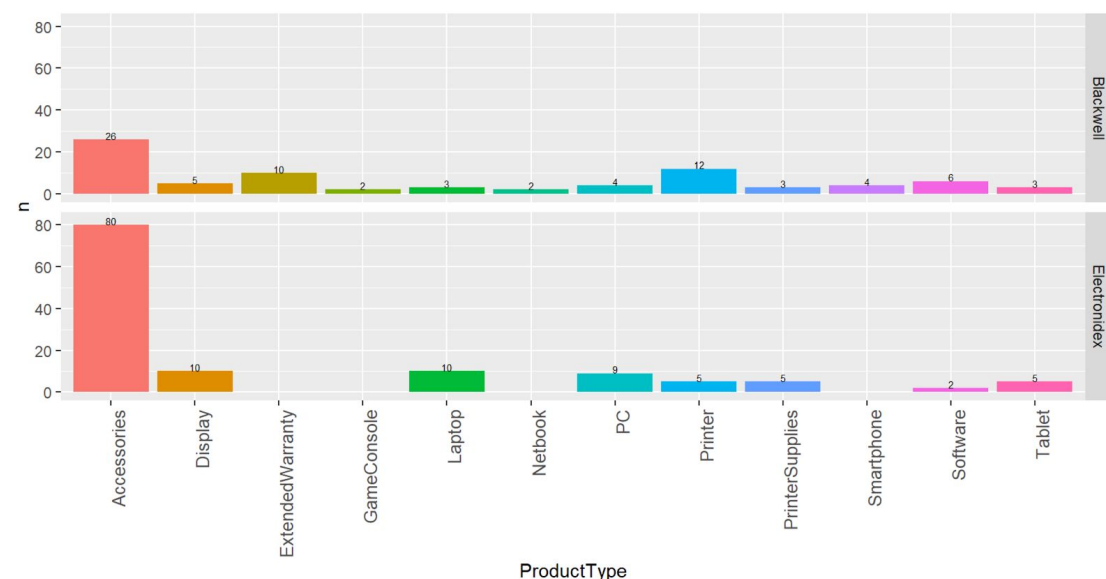
We compared Blackwell's and Electronidex's product portfolios to understand if they are overlapping or complementary.

To understand Electronidex customer buying patterns we used market basket analysis.

2. Electronidex and Blackwell product portfolio comparison

We were provided with a one month purchase history of Electronidex, Electronidex product list and we also had Blackwell product list I could use for comparison.

First we aligned product category names for both companies to allow portfolio comparison. Electronidex product categories were more detailed for Accessories so we combined them to get a like for like comparison with Blackwell.



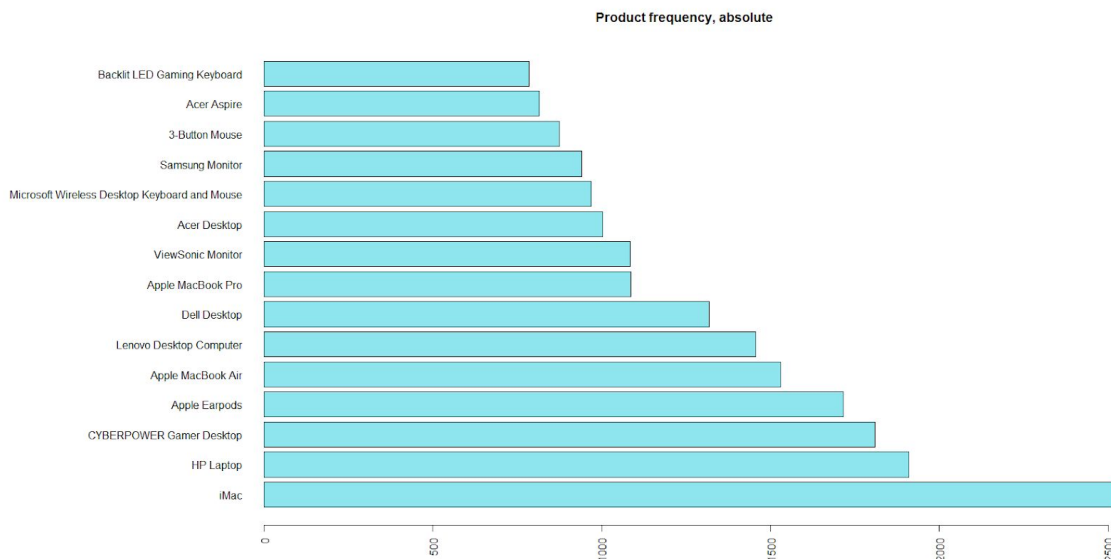
As we can see from above graph there is overlap in some product types but there are also complementary products in both portfolios. Electronidex customers could benefit from Blackwells extended warranty, game console, smartphone and software offerings and Blackwell portfolio would benefit from adding wider variety of displays, PC-s and various Accessories.

3. Electronidex purchase history analysis

On Electronidex purchase history there were total 9835 purchases across 125 different products with density of 0.03506172.

So total units sold by Electronidex in one month was $(9835 \times 125) \times 0.03506172 = 43104$

Top 15 products being as follows:



If we look at the top products sold by Electronidex we can see 9 PC-s and Laptops i.e. high value products in top 15. Blackwells sales history is very different with lower value accessories and extended warranties being the top sellers in volume. This is additional observation that Electronidex and Blackwell product offerings are complementary.

We can also see that majority of Electronidex customers are buying multiple products (up to 30) in one purchase. The average items purchased by Electronidex customer was $43104/9835 = 4.383$

element (itemset/transaction) length distribution:																						
sizes	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
2	2163	1647	1294	1021	856	646	540	439	353	247	171	119	77	72	56	41	26	20	10	10	10	
22	23	25	26	27	29	30																
5	3	1	1	3	1	1																

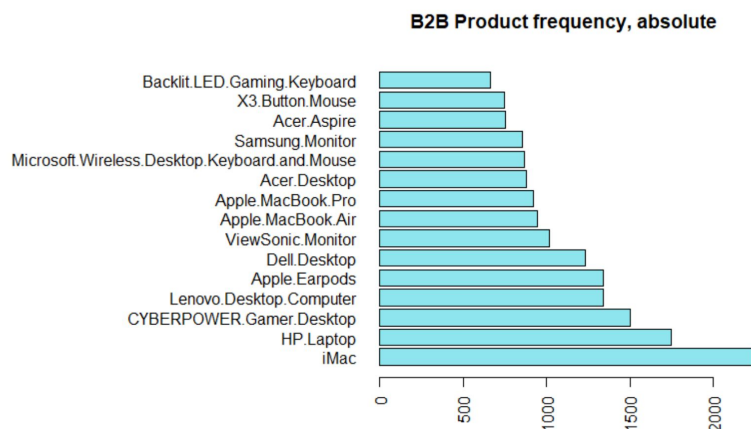
This purchasing pattern of five or more items is not common for Consumers so we decided to split the data to B2B and B2C based on following criteria.

If transaction includes two laptops or two PCs or in total more that five items we classified it as B2B. All other transactions were classified as B2C.

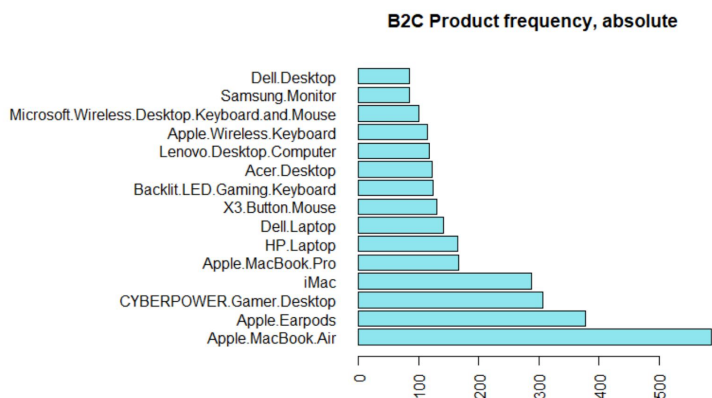
Based on above criteria there are 6135 B2B transactions totalling $(6135 * 125) * 0.04938354 = 37871$ products sold and 3698 B2C transactions totalling $(3698 * 125) * 0.01132071 = 5233$ products sold.

Top 15 products for B2B and B2C

B2B

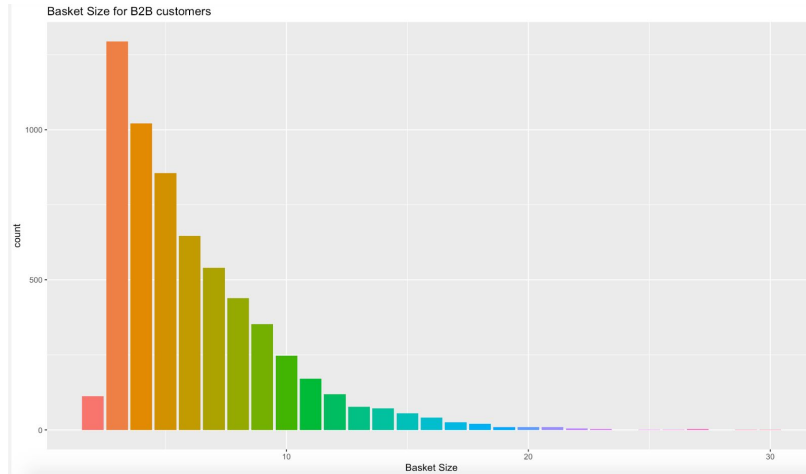


B2C

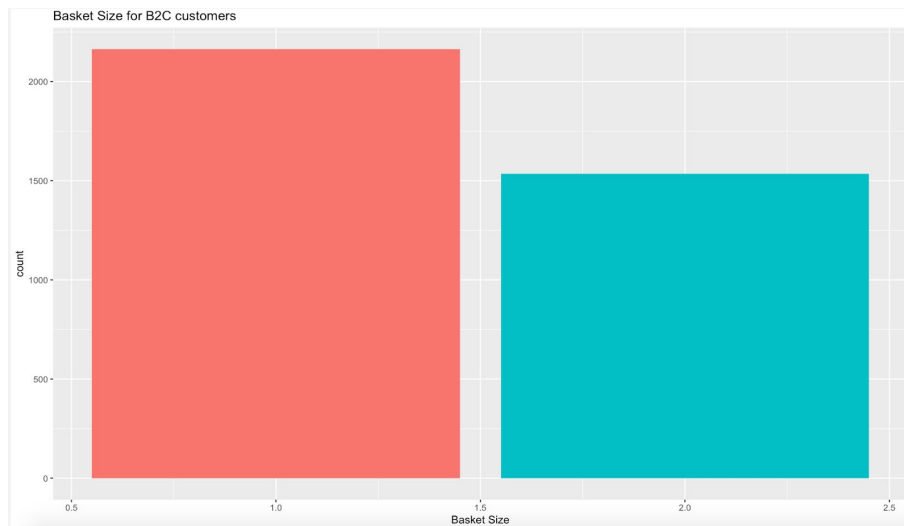


Number of products per transaction distribution by customer segment is as follows:

B2B



B2C



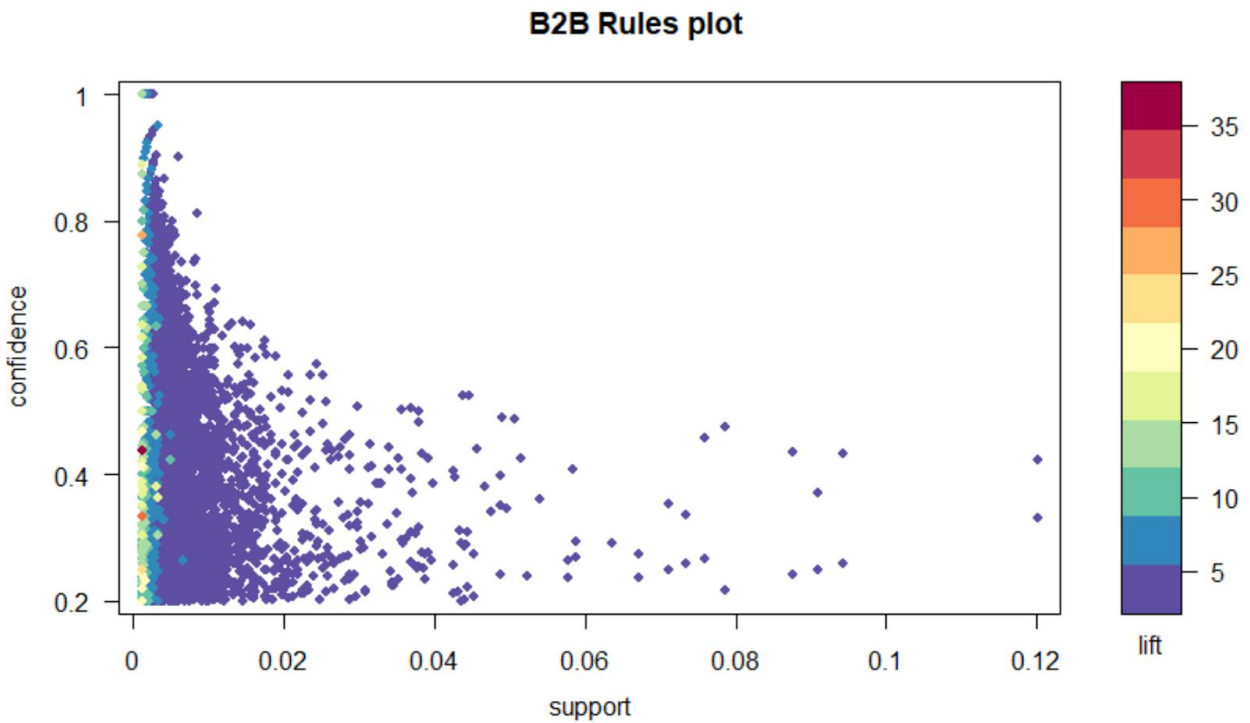
As a next step we looked at associations between products in both customer segments.

4. Market Basket Analysis to identify associations between products purchased

4.1. B2B

One of the goals was to identify associations between products purchased. We used arules algorithm to identify these associations.

First we found the rules based on very wide parameters (Support 0,001 and confidence 0,2 to see overall rules distribution).



As we can see there can be many rules, 63246 to be exact. We were not interested in rules with very high confidence (over 0,8) as we believe the potential uplift in volume based lower confidence rules would be higher.

Top 10 rules by support:

	lhs	rhs	support	confidence	lift	count
[1]	{HP.Laptop}	=> {iMac}	0.12013040	0.4225917	1.161559	737
[2]	{iMac}	=> {HP.Laptop}	0.12013040	0.3301971	1.161559	737
[3]	{Lenovo.Desktop.Computer}	=> {iMac}	0.09421353	0.4316654	1.186500	578
[4]	{iMac}	=> {Lenovo.Desktop.Computer}	0.09421353	0.2589606	1.186500	578
[5]	{CYBERPOWER.Gamer.Desktop}	=> {iMac}	0.09095355	0.3712575	1.020459	558
[6]	{iMac}	=> {CYBERPOWER.Gamer.Desktop}	0.09095355	0.2500000	1.020459	558
[7]	{Dell.Desktop}	=> {iMac}	0.08753056	0.4351702	1.196133	537
[8]	{iMac}	=> {Dell.Desktop}	0.08753056	0.2405914	1.196133	537
[9]	{ViewSonic.Monitor}	=> {iMac}	0.07872861	0.4739941	1.302847	483
[10]	{iMac}	=> {ViewSonic.Monitor}	0.07872861	0.2163978	1.302847	483

For B2B we were interested on rules that would help to sell additional high value products i.e. laptops in addition to the main products like PC-s. As Data Scientists in companies are desperate for more computing power we chose Eluktronics.Pro.Gaming.Laptop as powerful

laptop for out cross sell target.

We placed Eluktronics.Pro.Gaming.Laptop on the right hand side. These are the Top 10 rules by confidence that would help to boost Eluktronics.Pro.Gaming.Laptop sales.

	lhs	rhs	support	confidence	lift	count
[1]	{Logitech.MK360.Wireless.Keyboard.and.Mouse.Combo, Microsoft.Wireless.Desktop.Keyboard.and.Mouse}	=> {Eluktronics.Pro.Gaming.Laptop}	0.001303993	0.7272727	13.771044	8
[2]	{ASUS.Monitor, Logitech.MK360.Wireless.Keyboard.and.Mouse.Combo}	=> {Eluktronics.Pro.Gaming.Laptop}	0.001303993	0.6666667	12.623457	8
[3]	{Apple.Earpods, Logitech.MK360.Wireless.Keyboard.and.Mouse.Combo}	=> {Eluktronics.Pro.Gaming.Laptop}	0.001955990	0.6666667	12.623457	12
[4]	{Acer.Desktop, Logitech.MK360.Wireless.Keyboard.and.Mouse.Combo}	=> {Eluktronics.Pro.Gaming.Laptop}	0.001140994	0.5833333	11.045525	7
[5]	{X3.Button.Mouse, Logitech.MK360.Wireless.Keyboard.and.Mouse.Combo}	=> {Eluktronics.Pro.Gaming.Laptop}	0.001140994	0.5000000	9.467593	7
[6]	{CYBERPOWER.Gamer.Desktop, Logitech.MK360.Wireless.Keyboard.and.Mouse.Combo}	=> {Eluktronics.Pro.Gaming.Laptop}	0.001629992	0.5000000	9.467593	10
[7]	{iMac, Logitech.MK360.Wireless.Keyboard.and.Mouse.Combo}	=> {Eluktronics.Pro.Gaming.Laptop}	0.002444988	0.5000000	9.467593	15
[8]	{Logitech.MK360.Wireless.Keyboard.and.Mouse.Combo}	=> {Eluktronics.Pro.Gaming.Laptop}	0.004889976	0.4225352	8.000782	30
[9]	{Dell.Desktop, Logitech.MK360.Wireless.Keyboard.and.Mouse.Combo}	=> {Eluktronics.Pro.Gaming.Laptop}	0.001140994	0.4117647	7.796841	7
[10]	{ASUS.Chromebook, ASUS.Monitor, iMac, ViewSonic.Monitor}	=> {Eluktronics.Pro.Gaming.Laptop}	0.001140994	0.3500000	6.627315	7

4.2. B2C

As for B2B first we found the rules based on very wide parameters (Support 0,0001 and confidence 0,1 to see overall rules distribution.



There is a limited number (62) of rules even based on wide criteria. This is due to the fact that on 58,9% of purchases Consumers only buy one item.

For B2C it makes the most sense to look at the rules based on support as the counts in general were very low and we could not trust that the rule based on one occurrence would work.

	lhs	rhs	support	confidence	lift	count
[1]	{X3.Button.Mouse}	=> {Apple.Earpods}	0.0073012439	0.2076923	2.037258	27
[2]	{Acer.Monitor}	=> {CYBERPOWER.Gamer.Desktop}	0.0048674959	0.2812500	3.398897	18
[3]	{iPhone.Charger.Cable}	=> {Apple.MacBook.Air}	0.0032449973	0.3076923	1.938409	12
[4]	{Dell.KM117.Wireless.Keyboard...Mouse}	=> {Apple.MacBook.Air}	0.0018929151	0.2258065	1.422542	7
[5]	{Otium.Wireless.Sports.Bluetooth.Headphone}	=> {HP.Laptop}	0.0010816658	0.2222222	4.980471	4
[6]	{Generic.Black.3.Button}	=> {iMac}	0.0008112493	0.5000000	6.442509	3
[7]	{Logitech.MK360.Wireless.Keyboard.and.Mouse.Combo}	=> {CYBERPOWER.Gamer.Desktop}	0.0008112493	0.3750000	4.531863	3
[8]	{HDMI.Cable.6ft}	=> {CYBERPOWER.Gamer.Desktop}	0.0008112493	0.2500000	3.021242	3
[9]	{Rii.LED.Keyboard}	=> {iMac}	0.0008112493	0.2307692	2.973466	3
[10]	{XIBERIA.Gaming.Headset}	=> {CYBERPOWER.Gamer.Desktop}	0.0005408329	0.5000000	6.042484	2