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Does Distance Influence Profitability of Bank Customers?

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1. INTRODUCTION

In recent years, Brazilian banking sector was characterized by several changes, and we can highlight the increased of competition among

banks and the form of customer relationship with them. Increased of competition has basically occurred for two reasons: the first one, due to the possibility of portability among financial institutions of all types of bank loans obtained by customers, according to the Central Bank of Brazil Resolution number 3,401/2006; the second one, due to fall in basic interest rate of the economy, Selic Rate, from 19.5% in January, 2002 to 11.65%ⁱ in December, 2013, which reduced bank spread. Such situations have forced banks to increase their volume of loans and deposits in order to remain profitable, as well as, to identify potential customers in order to increase profitability.

Regarding the form of customer relationship with banks, the possibility of performing banking transactions remotely has decreased customer needs to go to bank branches, because they can pay their bills, check balance, in some cases invest money and obtain bank loan, and perform other transactions by alternative channels such as internet. According to table 1, the volume of transactions performed at alternative channels has been increasing and at branches has been remaining constant, although the number of bank branches increased from 13,396ⁱⁱ in December, 2000 to 23,051ⁱⁱⁱ in November, 2014, indicating that people have gone to branches less often.

Table 1 : Transactions by Channels

Channel	2000 ^{iv}	2013 ^v	Evolution
ATM	6.6	9.2	39%
Internet Banking	0.7	16.4	2,2%
Cash Tellers (Branches)	4.0	4.0	0%

Source: Brazilian Banks' Federation. Transactions in Millions. Not available mobile banking transactions.

So, it is possible that customers who live further away from branches are as profitable as those who live closer. This phenomenon doesn't occur in general retail, because customers who live in primary trading area, ie, closer to stores, are more profitable than those who live further away (Berman and Evans, 2006; Levy and Weitz, 2008). Understanding this relationship is important for banks to develop strategies for their

branches according to potential of profitability that each customer or customer segment can provide, not considering only those who live closer to branches.

Therefore, this study aims to identify whether customers who live further away from bank branches are as profitable as those who live closer. Thus, we selected 30 bank branches located in São Paulo city (Brazil) of one of the largest retail bank in Brazil and by analysis of variance, using Bonferroni method, we compare customer mean profitability of these branches among primary, secondary and fringe trading areas for those

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customers who receive their salaries by the bank and also for those who don't receive.

II. REVIEW OF LITERATURE

a) Banking services channel

The location of bank branches is one of the key factors that people take into account to choose the bank which they will become customers. (Clemes et al., 2010; Devlin, 2002; Dick, 2007; Lee and Marlowe, 2003; Ta and Har, 2000). However, after becoming customers, they can perform their transactions (bill payments, check balance, invest money, request bank loans, etc.) at any branch or alternative channels in which they perform their own transactions without the help of an employee, through self-service technology (Meuter et al., 2000). These alternative channels are internet banking, ATM, mobile banking and call center (in some situation, in this last case, it is necessary a contact with an employee).

Alternative channels are generally used for standard banking transactions (cash transfer, bill payments, etc.) and are rarely used for product sales (Bielski, 2007) which are usually conducted at branches. Branches are also responsible for performing customer standardized transactions through bank tellers, when customers wish. Many banking business can be performed on line, as requesting bank loans and investing money, but the propensity to use internet to invest will depend on investor's level of knowledge about financial investments (Pellinen et al., 2011), otherwise they will prefer to be served at bank branches.

On the other hand, factors as security (Chong et al., 2010; Dimitriadis, 2010; Kesharwani and Bisht, 2012; Ozdemir et al., 2008; Wessels and Drennan, 2010) and psychological barriers, especially regarding the familiarity with technology, inhibit the use of internet (Laukkanen and Kiviniemi, 2010) and habituation to perform many transactions through other channels (Iallouna and Chemingui, 2013) in hibitsuse of mobile banking, but even so, the number of transactions at alternative channels has been increasing at a higherrate than transactions performed at branches, as explained at introduction. On the other hand, a significant part of transactions performed at bank branches can be considered remote, because 40% of customers when perform them, it is at a different branch from which they opened their accounts. (Coughlan et al., 2010).

It mustbe also considered that because of convenience provided by alternative channels technology, it is one of the factors that influence customer satisfaction (Kaura, 2013), and it should provide a positive experience to increase word of mouth and the volume of deposits and bank loans (Klaus et al., 2013), because according to Aksoy (2014), variation in volume of deposits, one of the measures most

commonly used to measure the performance of banks, is 55% explained by customer satisfaction.

b) Performance measures

Deville and Leleu (2008) suggestedrelativized measures to measure the performance of banks, in which expenses, number of check accounts, etc., should be divided by total of deposits, because according to the authors, they reflect the main activity of banking sector. On the other hand, despite being important to measure market share, deposits don't either measure profitability, or consider costs.

So, Moeni et al. (2011) considering *Customer Life Value* - CLV definition (present value of projection profitability of future results), established a definition of performance for banking sector which consists in the present value of the sum of revenues to be generated by their customers, deducted costs, including those related to attraction, sales and services.

For this study, considering that it aims to compare customers profitability in relation to the distance they live from the branch where they opened their checking accounts, the best measure for profitability is the contribution margin provided by customers, because it considers revenue from all products and services, including interest rate payments, and bank expenses with customers.

c) Importance of location

A measure to check how store location is attractive to customers, it is its trading area, because according to Parente and Barki (2014, p. 330), "reflects the spatial dimension of the retail market demand [...] is defined as the geographic area containing most consumers of a store", which extension will depend on store power to attract consumers.

In general retail, usually, the market potential and the socio-demographic characteristics of trading area are factors that influence performance, sales volume, customers segmentation strategy, internal characteristics of store environment (number of cash tellers, for example) and opening hours (Kumar and Karande, 2000). Camargo Jr. and Elias (2010) identified that the potential of each store also depends on its location, because it is one of trading area determining factors and according to its extension, stores can attract customers from different places whose consumer behavior can varies a lot.

Bank branch performance is also influenced by local characteristics and its trading area. According to Deville and Leleu (2008) there are differences in branch results according to geography area of operation, which requires different development of strategies, different incentives and different performance estimation for each branch or region. According to Applebaum (1966), trading area relates to the customers' geographical dispersion around a store, and travel time by car (or

another measure of time in relation to distance). It can be divided into three segments:

- Primary area: the region closest to the store, in which most of its customers are concentrated. The percentage of customers may vary according to the type of trade and location, but it generally encompasses 60% of customers. According to Parente and Barki (2014), the percentage ranges from 60 to 75%, however Levy and Weitz (2008) restrict this to 60-65%, and Berman and Evans (2006) extend it to 50-80%;
- Secondary area: the region around the primary. This is of secondary importance in terms of sales, accounting for 15 to 25% of customers (Parente and Barki, 2014; Berman and Evans, 2006);
- Fringe area: this contains the remaining customers, includes those who buy occasionally and it is considered a residual area.

III. METHODOLOGY

a) Data Extraction

From one of the largest bank in Brazil, we selected a sample, by judgment, of 30 bank branches located in São Paulo city, with the aim of composing a representative sample of branches according to their different sizes, regions and the socio-economic levels of their surroundings and being dispersed over all areas in the city. For each one of these branches, we obtained from the bank's database system the following data about active individuals customers (those who are using the bank services).

- Home address;
- Contribution margin of two periods;
- If the customer receive or doesn't his salary by the bank

Table 2 : Characteristics of Branches: customer who don't receive their salaries by the bank

Branch	Customers	Mean Contribution Margin (US\$)	Variation Coefficient (%)	Primary Trading Area (Km)	Secondary Trading Area (Km)	Fringe Trading Area (Km)
1	580	19	419	10.6	23.8	2,369
2	3,328	63	235	3.3	11.1	2,195
3	1,669	55	182	5.2	19.8	1,474
4	2,036	77	275	2.7	16.4	2,311
5	2,611	69	344	8.7	25.5	2,368
6	1,711	82	351	5.8	24.1	2,370
7	1,433	74	269	9.0	27.1	1,493
8	2,589	60	302	1.5	12.3	2,320
9	2,155	51	213	2.6	12.5	2,461
10	1,676	76	289	4.3	19.0	2,371
11	765	116	242	7.9	22.9	1,460
12	1,775	61	351	2.6	17.3	421
13	1,130	52	284	1.6	16.0	2,095
14	1,271	48	295	14.5	25.9	2,240
15	2,594	69	320	2.6	7.7	2,196
16	1,062	96	259	6.7	19.7	888
17	1,384	56	244	1.6	10.7	2,298
18	1,347	68	234	0.9	21.7	2,694
19	1,439	64	230	7.6	21.9	2,368
20	2,674	63	233	2.4	9.0	2,831
21	1,396	86	325	9.5	22.7	2,365
22	1,446	43	258	1.5	7.2	2,275
23	1,743	44	243	2.0	6.7	1,346
24	1,720	61	214	1.7	10.4	2,698
25	618	80	383	2.7	18.3	492
26	1,517	57	241	2.0	9.5	1,386
27	2,143	55	234	10.1	25.3	1,454
28	712	62	305	9.4	22.6	2,371
29	2,976	42	253	2.9	16.1	2,360
30	876	58	369	2.6	11.2	1,700
Minimum	580	19	182	0.9	7.2	421
Maximum	3,328	116	419	14.5	27.1	2,831

Table 3 : Characteristics of Branches:customer who receive their salaries by the bank

Branch	Customers	Mean Contribution Margin (US\$)	Variation Coefficient (%)	Primary Trading Area (Km)	Secondary Trading Area (Km)	Fringe Trading Area (Km)
1	203	115	202	12.4	26.5	386
2	2,110	132	186	3.3	11.1	1,451
3	1,036	104	144	6.5	19.2	541
4	1,360	121	158	3.7	14.4	534
5	1,213	101	200	14.8	27.6	357
6	1,010	154	208	4.3	23.4	2,319
7	1,048	150	344	9.6	26.8	543
8	1,259	111	167	1.9	10.4	455
9	2,557	119	160	2.9	7.9	2,460
10	740	129	196	2.7	15.0	2,135
11	288	246	180	2.1	19.0	484
12	996	157	209	2.3	10.5	1,912
13	756	127	173	2.4	14.9	2,325
14	432	87	172	13.5	24.2	494
15	1,741	121	145	2.5	9.3	564
16	360	164	213	8.1	20.0	2,228
17	1,172	89	158	1.8	10.2	470
18	557	147	179	0.6	17.7	3,304
19	1,044	163	181	8.8	21.2	2,368
20	1,832	105	159	2.3	9.0	2,455
21	454	176	189	8.7	25.2	2,213
22	985	85	147	2.0	7.6	880
23	1,458	108	190	2.1	8.4	2,365
24	1,035	119	157	1.5	9.2	213
25	330	113	169	4.4	16.9	2,121
26	1,254	115	191	1.8	7.1	182
27	1,238	108	200	12.4	26.3	2,316
28	309	128	205	8.3	18.6	983
29	4,517	134	174	2.1	12.5	1,040
30	571	91	196	2.2	7.1	2,361
Minimum	203	85	144	0.6	7.1	182
Maximum	4,517	246	344	14.8	27.6	3,304

b) Analysis Process

For every customer, through mapinfo software, we calculated the linear distance between customer's home and the branch. Customers whose addresses could not be processed due to any data inconsistency, such as no number of residence, street not located by the software, and other inconsistencies, were discarded corresponding to 12% of total customers. Thus, for this study, 84,241 customers were considered.

Considering that for customers who receive their salaries by the bank, opening of checking account is mandatory, and in some cases, customers can't even choose the branch in which he will open his account, we divided customers into two groups: those who receive their salaries by bank and those who don't.

For each branch and for each group of customers, we calculated the mean of contribution margin of two periods, the primary trading area,

corresponding to a radius that encompasses 50% of customers who live closer to the branch, the secondary trading area (around primary one) which encompasses 40% of customers and the fringe one, containing 10% of remaining customers (Hanna, 2011).

In order to identify whether there is any significant difference in profitability provided by customer among three trading areas, a comparison of mean profitability among these areas by branch and by customer group was performed at 5% significance level, using for this purpose, analysis of variance by Bonferroni method, since the number of customers in each trading area is different. We performed 180 comparisons, because they were performed among three trading areas (primary – secondary, primary – fringe, secondary – fringe), for two groups of customers for each one of 30 branches.

IV. DATA ANALYSIS, RESULTS AND DISCUSSION

For both groups of customers, the contribution margin varies a lot, because for those who don't receive their salaries by the bank, the variation coefficient (standard deviation / mean) of the contribution margin resulted in 290%, and for those who receive, in 193%. Contribution margin is negative for 4% of total customers because of several factors, such as default. This variation of profitability can also be observed in relation to all customers of the same branch, varying from 182 to 419%, for customers who don't receive their salaries by the bank, and from 144% to 344% for those who receive.

One factor that may explain this variation in contribution margin among customers is the high extent of trading area that enables branches to attract customers from different parts of the city with different socio-demographic profiles. Thus the income of customers of a branch varies a lot, and the higher the income, greater the possibility of investing higher values or obtaining higher values of bank loans, and this increases the profitability provided by customers.

The mean contribution margin provided by customers who receive their salaries by the bank ($M(33,865) = 123.52$) is higher than for those who don't receive ($M(50,376) = 62.63$), and the difference between these means is significant ($t(84,239) = 41.95$, $p < .01$).

Considering just customers who don't receive their salaries by the bank, we compared customer mean contribution margin among three trading areas by branch, using for this purpose analysis of variance by Bonferroni method, and we concluded that for 17 branches there aren't significant differences at 5% significance level.

Table 4 : Means Comparison: Trading Area - customers who don't receive their salaries by the bank

Branch	df Total	Between Groups		
		df	F	Sig
22	1,445	2	.244	.783
19	1,438	2	.278	.758
20	2,673	2	.609	.544
24	1,719	2	.729	.482
25	617	2	.891	.411
6	1,71	2	1.147	.318
18	1,346	2	1.246	.288
2	3,327	2	1.318	.268
10	1,675	2	1.512	.221
1	579	2	1.519	.221
23	1,742	2	1.540	.215
17	1,383	2	2.294	.101
14	1,270	2	2.510	.082
28	711	2	2.530	.081
13	1,129	2	2.591	.075
29	2,975	2	2.588	.075
30	875	2	2.879	.057
8	2,588	2	3.667	.026
16	1,061	2	4.157	.016
9	2,154	2	4.176	.015
26	1,516	2	4.536	.011
4	2,035	2	4.738	.009
12	1,774	2	5.334	.005
11	764	2	5.469	.004
5	2,61	2	6.525	.001
21	1,395	2	6.686	.001
7	1,432	2	8.498	.000
3	1,668	2	9.162	.000
27	2,142	2	10.577	.000
15	2,593	2	17.142	.000

So there are 13 branches with some significant difference in mean profitability by customer between at least two trading areas: as we can see at table 5, for five branches (4, 9, 11, 21 and 26) significant differences ($p < .05$) are between primary and secondary trading area, with no significant differences between each one of these two areas and the fringe one.

Therefore, we can conclude that, proportionally, the fringe area is as important as the primary and secondary one and it can't be considered a residual area. In addition, customer mean profitability in secondary area is higher than in primary one for branches 4 and 26, as evident from the negative sign resultant from difference between mean profitability by

customer of primary and secondary area. So, we can also conclude that for these two branches, the secondary is not an area of less importance than the primary one.

For other four branches (3, 5, 7 and 27), significant differences are between the primary and secondary area, and between the primary and fringe one, with no significant differences between the secondary and fringe area. So, we can conclude again that fringe area isn't a residual one, because it is, proportionally, as important as the secondary area which represents 40% of customers.

For branch 8, significant difference is between secondary and fringe area, and for branches 12 e 16, significant differences are between primary and fringe

one. In these cases, we can't also say that fringe area is residual, because, proportionally, in first case, it is as important as primary one, and in the second case it is as important as secondary one. For these three branches, we can't also say that the secondary area is less important than primary one, because there isn't significant difference of customer mean profitability between these two areas.

Finally, for branch 15 there are two significant differences: between primary and fringe area and between secondary and fringe one, however, mean profitability by customer is higher in fringe area, as evident from the negative sign resultant from difference between primary and fringe area and between secondary and fringe one.

Table 5 : Branches with Difference in Customer Mean Profitability among Trading Area: customers who don't receive their salaries by the bank

Branch	Difference Between Trading Areas	Mean Difference	Sig.
4		-27.01	.019
9		12.29	.042
11	Primary - Secondary	67.94	.005
21		54.36	.002
26		-22.09	.009
3	Primary - Secondary	17.29	.003
	Primary - Fringe	29.36	.002
5	Primary - Secondary	29.62	.008
	Primary - Fringe	44.00	.018
7	Primary - Secondary	38.32	.002
	Primary - Fringe	56.95	.005
27	Primary - Secondary	24.94	.000
	Primary - Fringe	26.33	.017
12		56.23	.004
16	Primary - Fringe	26.26	.036
8	Secondary - Fringe	32.45	.031
15	Primary - Fringe	-74.83	.000
	Secondary - Fringe	-88.69	.000

Thus, although in some situations there are differences in customer mean profitability among primary, secondary and fringe trading areas, we can't say that mean decreases from primary to fringe area such as in general retail. But even if it decreases, for more than half of analyzed branches, 17, there aren't significant differences in customer mean profitability among trading areas. Therefore we can conclude that profitability provided by customer is not related to the distance they live from the branch where they opened their checking accounts.

We can observe the same phenomenon for customers who receive their salaries by the bank, including the number of branches (13) with significant differences in customer mean profitability between at least two trading areas. In these 13 branches, as show in tables 6 and 7, which are not necessarily the same when we considered only those customers who don't receive their salaries by the bank, fringe area can't also be considered a residual one and, in some cases, customer mean profitability in secondary area is higher than in primary one (branches 8 and 23); and in other

case this mean in fringe area is higher than in primary one (branch 23). There is also a specific case: branch 29 whose significant difference between means are among three trading areas; the fringe area has the highest mean profitability by customer and the primary

one, the lowest, as evident from the negative sign resultant from difference between mean profitability by customer of: primary and secondary area, primary and fringe one and secondary and fringe area.

Table 6 : Means Comparison: Trading Area - customers who receive their salaries by the bank

Branch	df Total	Between Groups		
		df	F	P
11	287	2	.003	.997
4	1,359	2	.027	.974
18	556	2	.133	.876
6	984	2	.223	.800
17	1,171	2	.344	.709
22	453	2	.390	.677
1	1,043	2	.686	.505
19	202	2	.838	.433
20	570	2	.913	.402
24	1,034	2	1.048	.351
25	1,74	2	1.375	.254
3	329	2	1.747	.175
15	1,253	2	1.929	.146
16	1,009	2	2.054	.130
14	431	2	2.198	.112
26	1,035	2	2.326	.098
7	1,047	2	2.909	.055
13	2,556	2	3.450	.032
30	359	2	3.571	.029
9	1,831	2	3.703	.025
8	1,258	2	5.324	.005
21	739	2	6.236	.002
23	308	2	6.777	.001
2	995	2	7.644	.000
10	755	2	7.839	.000
28	2,109	2	8.734	.000
12	1,457	2	8.729	.000
27	1,237	2	9.651	.000
5	1,212	2	15.299	.000
29	4,516	2	31.355	.000

Table 7 : Branches with Difference in Customer Mean Profitability among Trading Area: customers who receive their salaries by the bank

Branch	Difference Between Trading Areas	Mean Difference	Sig
9	Primary - Secondary	20.75	.028
13		43.58	.029
21		115.38	.001
30		38.42	.047
2	Primary - Secondary	33.57	.009
	Primary - Fringe	59.66	.004
5	Primary - Secondary	65.97	.000
	Primary - Fringe	47.67	.047
10	Primary - Secondary	71.14	.001
	Primary - Fringe	78.26	.041
12	Primary - Secondary	85.34	.000
	Primary - Fringe	90.95	.034
23	Primary - Secondary	-35.45	.005
	Primary - Fringe	-50.11	.020
27	Primary - Secondary	50.79	.000
	Primary - Fringe	62.87	.009
28	Primary - Secondary	118.1	.000
	Primary - Fringe	134.55	.024
8	Primary - Secondary	-29.11	.026
	Secondary - Fringe	49.6	.021
29	Primary - Secondary	-40.24	.000
	Primary - Fringe	-83.5	.000
	Secondary - Fringe	-43.26	.001

V. CONCLUSION

The study aimed to identify whether profitability provided by a bank customer is related to distance he lives from the branch where he opened his checking account. As measure of customer profitability, we used contribution margin because it reflects revenues from all purchased products and services by customers, including payment of fees, of interest rate, etc., and considers all expenses with them.

Thus, we selected a sample of 30 bank branches located in São Paulo city (Brazil) and from these branches we selected all active individual customers, totaling 84,241. From the bank's database system, we obtained the following data by customer: home address, contribution margin and whether the salary's customer was or not received by the bank. Through map info software, we calculated the linear distance between customer's home and the branch, enabling us to calculate primary, secondary and fringe trading area, considering customers who receive their salaries by the bank and those who don't receive.

Customers were divided into groups: those who receive their salaries by the bank and those who don't. Mean profitability provided by customers who receive their salaries by the bank is higher than those who don't receive. For each group of customers and for branch, we compared mean profitability by trading area, using for this purpose analysis of variance, and we could conclude that for most cases there aren't significant differences among three trading areas and when there was a significant difference, generally, fringe trading area couldn't be considered a residual one, and in some cases, mean profitability by customer in this area was higher than in primary, as well as, in some cases, mean profitability in secondary area was higher than in primary one.

So, we could conclude that customers profitability is not related to the distance they live from the branch where they opened their checking accounts, therefore trading area theory doesn't apply for banking sector, because according to this theory: customers who live closer to store (primary trading area) are more

profitable than those who live far away (in secondary or fringe trading area), fringe area is considered a residual one and secondary area is considered of less importance, compared to primary one.

Bank managers must take into account all customers and not just those who live closer to the branch or who go there frequently in developing customers retention and loyalty strategies. Branch employees should establish regular and personalized contacts with those customers who live further away or rarely go to the branch, since they are profitability or are potential to be so. Whenever possible, the evolution in the remote service or self-service technology should take these aspects into account.

The study was limited to São Paulo city and considered only individual customers. This same study could be replicated to other major cities of the country and cities abroad, also considering legal entities. Regarding variables, other could be considered as level of loyalty, types of purchased products and services, and so on.

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