

**Location-allocation Problem for Banking Correspondent Services: the Colombian  
Urban Market Case**

by

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## Abstract

Banking correspondents are a channel through which third parties operate on behalf of a bank, under a contract authorising the provision of some banking services. This model has been implemented extensively in developing countries, as a channel to increase financial inclusion by bringing financial products and services closer to marginalised populations. However, there is a lack of studies on the criteria employed by banks when selecting retailers to turn into banking correspondents (BC), in turn preventing the channel from offering a service portfolio adequate to the capacities of the retailers providing this kind of services, affecting the profitability and sustainability of the channel. The current research parted from the agency theory, which allowed to understand the relationship between the parties involved in the delivery of BC services, seeking to boost financial inclusion in Colombia through the development of the BC channel by solving the problem of location and portfolio allocation for retailers acting as banking correspondents in Colombian urban zones. It parted from the case of Bogota, where improvements were achieved in the selection of retailers and portfolio allocation, thus enhancing the relationship between agents, allowing banks to select banking correspondents and allocating them a particular service portfolio, while transaction volumes and channel profits are maximised. This was done through the development of a methodology comprising five stages, namely: (a) the development of a taxonomy on network integration models and financial services; (b) the development of a taxonomy on the strategies of small and medium retailers that could be selected as banking correspondents; (c) the validation of both taxonomies through cluster analyses; (d) validation of the resulting classifications through an ANOVA and a Kruskal-Wallis H test; and (e) the elaboration of a chance-constrained programming model that uses the elements built and validated in the former stages. A classification of retailers was obtained from factors related to their operational and business strategies, as well as a classification of banking correspondents based on their

service portfolios. It was also noted there is a significant relationship between the groups from both classifications, which led to the chance-constrained programming model being run on a sample of retailers in Bogotá, located at the borough of Suba. The model enabled to select those retailers best suited to become banking correspondents, determining the number of transactions according to their constraints in terms of retailer capabilities, banks and the environment, while estimating the expected income from these banking correspondent operations.

**Keywords:** banking correspondents, financial inclusion, linear programming, location-allocation, stochastic transactions.

## **Dedication**

To my parents in heaven, my beloved ones, the professors and tutors; to my collaborators, partners and friends. Especially to my two sons and colleagues, for their grandparents' spirit that lives on forever through them.

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## Chapter 1: Introduction

The banking correspondent (BC) channel has made possible to increase financial inclusion in developing countries; however, the current business model is subsidised in the Colombian case, specially at the most remote municipalities. Despite the studies performed on the channel, replicable and propositional research is still required. The former is also reflected in the absence of standardised criteria for the selection and allocation of BCs by banks, as these take a one-size-fits-all approach when it comes to service, without taking the constraints related with the capabilities of retailers into account at the moment of allocating a portfolio and a delegation model. In turn, this affects the profitability and sustainability of the channel at the long term.

The current research defines the transactions for financial services as random, due to the lack of knowledge on the market attended by BCs, the importance of the informal sector in the Colombian economy, low bancarization rates among those targeted by the services BCs offer, and the existence of non-seasonal factors (payday, holidays, etc.) that explain volatility on the operation volumes for a given period.

Therefore, the current study is intended to help financial inclusion through the development of the BC channel in Colombia, by optimising the selection of feasible retailers, a definition of the network integration model framed within delegation types, and portfolio allocation parting from the constraints in the capabilities of retailers and banks, allowing to maximise the number of transactions per service portfolio for BCs. The analysis of this problem is mainly approached from the agency theory (Jensen and Meckling, 1976), the theory of constraints (TOC) and product mix (Cannon, Cannon, and Low, 2013; Lee and Plenert, 1993; Mabin, 2001), as these theories allow addressing the service delegation process while taking the restrictions of the third party on which such services are delegated into account. This type of analysis constitutes a contribution for all the incumbent actors in the

business, such as executives and managers in banks, the State and public policy makers, by gaining a better understanding of the ecosystem surrounding BCs. Specifically, banks would be delivered a tool to solve the location-allocation problem faced when expanding BC networks while taking the capabilities, restrictions and limitations of retailers into consideration, incorporating the contribution from the theory of constraints, directed towards obtaining of a profitable business model, initially in Bogotá, Colombia. The above comes from a commercial perspective, without abandoning the increase of the social impact regarding financial inclusion represented by BCs.

Therefore, for the current research proposal, the background of the problem is exposed and the research problem is defined throughout the first chapter, as well as its relevance, the proposed research questions, their associated hypotheses and the theoretical framework serving as the basis for the development of the research, followed by an exposition of the assumptions, limitations and delimitations defined at the current study.

### **Background of the Problem**

There is an ongoing concern among governments around the world to increase financial inclusion in a comprehensive manner, enabling access and use of financial services and products regardless of income, location, education of users and customers of the system. The former gains relevance as the expansion of the financial sector has been proved to offer a positive impact on economic development, as a consequence of increased savings and improvements in resource allocation (Sanguinetti, 2011).

Innovative manners that promote not only growth in financial markets, but also inclusion and access for a countless number of inhabitants historically marginalised of the banking system, have been developed in some countries. At this point, the services known as *branchless banking* must be mentioned (Sanguinetti, 2011). Ivatury and Mas (2008) defined branchless banking as a way that allows low-cost operations, promotes physical expansion

and increases in banking coverage, based on low-value products, by making use of technological advances and resources from third-party establishments such as convenience stores, post offices and retail facilities.

Now, one of the branchless banking channels is that of BCs (to be studied in the current research) which, according to Lauer, Dias, and Tarazi (2011), is defined as:

...any third party acting on behalf of a bank (or other principal), under the terms established in a contract of agency, services or similar. In most countries, the principal is legally responsible for the acts of its agents, regardless of whether such acts are explicitly or implicitly authorised. (p. 1, translated from the original Spanish)

Complementing, Mas and Siedek (2008) stated that BCs are retail establishments possessing some sort of agreement with financial institutions, authorised to perform some banking operations. Even so, it must be highlighted that BCs hold multiple denominations, according to the region or country where these are located. In Peru, the term *Cajeros Corresponsales* [Correspondent Cashiers] was coined since 2006 (Ivatury and Mas, 2008). In Brazil and Colombia, the term *Corresponsales Bancarios* [BCs] is utilised (Decreto 2672, 2012; Zambaldi, Morano, and González, 2012). In the latter country, the term Non-BC (NBC) was employed at first (Decreto 2233, 2006), however since the publication of the *Decreto* (Decree) 2672 of 2012 the term BC gained use instead. Through this, it is possible to state that although there are several terms being used, all point to the characterisation of the channel known as *banking agent* networks at a global scale (Mas and Siedek, 2008).

Following up, it is relevant to characterise the parties and elements constituting the BC channel:

(1) retail stores easily accessible by low-income clients, (2) an electronic payment infrastructure, and (3) an account platform, this latter being provided mostly by traditional banks. The account platform is necessarily operated internally; that is,



within the organizational boundaries of a banking institution. Retail establishments, in contrast, are obviously outside agents, acting as intermediaries between the institution and its customers. The payment infrastructure, however, is the only element that can be operated either by the bank or by third parties. (Jayo, Diniz, Zambaldi, and Christopoulos, 2011, pp. 504-505)

Given the participation of multiple parties in the BC channel, it is possible to define it as a grid of networks, connecting small and medium retailers, banks and network managers. In order to guarantee the correct operation of these BC networks, it is important to develop a set of integration and operationalisation activities for them, among which Jayo et al. (2011) identified two large subsets: business process activities and technical and logistic activities, which would be the activities required to ensure the correct performance of the network.

Parting from the above, Jayo et al. (2011) stated that it was possible to identify multiple BC network integration management models based on the way these activities were distributed between banks and integrators, known as delegation models. When the business process, technical and logistic activities are handled by network integration companies, the model under which the operation would be performed is known as *full delegation*. In the event that both activities were carried out only by banks, the network would be operating under a *no delegation* model. Finally, the *partial delegation* model can be found, where business process activities are responsibility of the banks while technical and logistic ones are carried out by integrators. This delegation of activities, described from the agency theory (Williamson. 1985), proposes a solution to the principal-agent problem, in which one of the parties (the principal) delegates a task or activity on another (the agent), who is in charge of carrying them out, constituting the theoretical basis for understanding the existing relationships at the channel, to the extent that agency theory seeks the way to solve failures in

such relationship created from divergences on the goals or targets of principal and agents, through contracts.

On the reasons behind the development of BCs in Colombia, it is possible to make a parallel with the Brazilian case. There, one of the reasons for the success of BCs could be attributed to government subsidy programs launched in 1990, and the creation of BCs was a process that helped boost such policies, thus bringing with them a strong process of social inclusion by transferring government benefits to citizens, improving quality of life, increasing self-esteem and creating income opportunities (Zambaldi et al., 2012). The same factor can be found in Colombia, where the government planned the expansion of the conditional transfer program, known as *Familias en Acción* [Families in Action] (FA) to all municipalities, for which adequate payment channels were needed to allow its implementation.

Likewise, it was found that one of the driving forces in the Brazilian case was the need for bill collection, mainly, of utilities in regions with limited banking coverage (Jayo et al., 2011). This feature is also present in the country of study, where the channel is primarily dedicated to utility collection, according to the researcher's experience. This fact is evident in the figures reported by *Banca de las Oportunidades* [Bank of Opportunities] (BdO, 2015a) for November 2015, which indicated that 53.5 % of all transactions in the channel corresponded to utility bill payments.

Finally, the last dynamic that led to business success in Brazil was the interest banks showed in developing a channel to alleviate ordinary traffic in their branches (Jayo et al., 2011). In turn, this factor becomes relevant in Colombia when analysing annual growth rates on the points of contact (POC) for BCs, in contrast to traditional branches. According to *Superintendencia Financiera de Colombia* [Financial Superintendence of Colombia] (SFC) and BdO (2014), the growth rate for POC in the BC channel went up to 51.4 % in December 2013, while it was 5.1% in traditional banking branches.

Now, regarding Colombia, BdO (2015b) stated that up to November of 2015, there were 92,304 BCs covering 99% of the municipalities, which performed a monthly average of 142 transactions per agent. Thus, it is possible to assess that in Colombia:

The intervention through subsidies provided by BdO had a positive effect, not only by achieving to expand the presence of formal financial institutions in remote areas and in a high percentage of municipalities with fewer than 10,000 inhabitants, but also when mobilizing the arrival of other banks to these same areas. (Marulanda Consultores, 2013, p. 20, translated from the original Spanish)

In this sense, it is important to highlight this continued reliance on subsidies as a peril for the survival and continuity of the channel, due to the need for the latter to work under the natural logic of market forces. Facing the issue, Marulanda Consultores (2013) stated that: “Colombia faces the challenge of maintaining financial presence in these municipalities. It would be recommended to evaluate alternative models for the operation of the NBC”<sup>1</sup> (p. 30, translated from the original Spanish).

Summarising, the main problem affecting the development of the BC channel in Colombia can be found in its reliance on public subsidies. The current study approached this obstacle on BC channel growth, for which it was required to review the current business model, starting in Bogotá. Meanwhile, studies conducted so far on BCs have not detailed on the features and capabilities of those retailers, and how these affect the service portfolios allocated to them. As said factor is also ignored by banks, including it at the moment of selecting retailers to be opened as BCs and allocating a service portfolio could be the key to address the inefficiencies found in Colombia.

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<sup>1</sup> Starting out of the expedition of the *Decreto* (Decree) 2672 of 2012, through which the *Decreto* 2555 of 2010 was modified in relation to the financial services offered through BCs - a change was noted in the denomination of the channel, since the term non-BCs (NBC) was dropped in favour of BCs (BC).

To incorporate the retailers and its capabilities in the model that was proposed, the current study followed the process and conclusions obtained by Ramakrishnan (2010). This author developed a classification of informal retail stores in India and the strategies adopted by retailers to deal with the expansion of formal chain stores in the country. In order to do so, Ramakrishnan (2010) identified two types of strategies employed by retailers, namely: (a) functional strategies, related to business daily operations; and (b) business strategies, which relate to the positioning of the store in the market. The importance of said study lies on the emphasis it gives to the capabilities and strategies of retailers, and how these affect their performance.

### **Statement of the Problem**

Task delegation and service allocation problems are found in multiple practical situations, where these could be solved through the formulation of models that minimise costs and define an optimal number of establishments offering a specific service portfolio (Cooper, 1963). This is a recurring problem when identifying new business opportunities in markets where there is not a clear customer approach strategy aimed to create a portfolio following a set of established parameters, in order to allow the definition of a resource allocation model.

A newly developed financial channel, known as banking correspondents, represents a medium through which banks delegate the delivery of banking services to third parties, in locations where it would be prohibitively expensive for banks to offer these services otherwise. Thus, said delegation model establishes an agency relationship between these parties, which attempts to reconcile the interests of banks, network managers and those serving as banking correspondents, in accordance to the needs of banking customers and user demanding services. This relationship follows some features of the agency theory (Williamson, 1985) such as delegation of a wide activity portfolio that changes in time, information exchanges on the activities of the agent benefitting the principal (transactions

number and volume), but ignoring certain features of the principal-agent problem that might compromise agent activity, such as capabilities and the environment determining its activities as banking correspondents. The latter constituted the main contribution of the current research.

In this sense, the World Economic Forum (2012) identified certain challenges faced by business correspondence models around the world, particularly those in developing countries, trying to penetrate large consumer markets. Specifically, the subjects identified as obstacles to the expansion of this kind of services, and in ensuring sustainability throughout time, are operational barriers, excessive or ambiguous regulation, sales regulation, and expenses originated by creating this kind of approach strategy for new markets.

On the latter, to ensure expenses are covered, it is important that service providers identify a sizable population that could be attended by agents, in places where demand for these services could be significant. Likewise, it is important for meeting population needs that service providers identify a set of agents, to which these services could be delegated in order to serve the population. For the above, it is important there is a constant interconnection between this agent network and the population, to ensure sustainability in these models. “The key to profitability is ensuring that the customer base and the agent network grow and engage” (World Economic Forum, 2012, p. 25).

In the Colombian case, the problem has been defined on these terms, as it has been possible to evidence obstacles on the development of BCs in Colombia. Despite the ample coverage represented by 92,304 BCs, physical presence in 99 % of the municipalities, and the existence of 19.1 BCs for every 10,000 inhabitants up to November 2015 (BdO, 2015b); deficiencies on the operation and transactional levels could be seen in some regions where correspondents were implemented. This is due to a principal-agent problem where banks cannot justify the management of banking correspondents, leading to insufficient payment

and no discrimination between multiple levels of service and difficulty, similar to the findings of Hughes and Mester (2008) for maximising banking efficiency. An example of the above lies on the fact that 40% of Colombian BCs did not perform any transaction during 2013, according to BdO (2013).

Parting from this, the channel itself might be considered at risk since the Colombian Government, on its rush to increase coverage, developed a public policy that encouraged financial institutions, via subsidies, to invest in the channel expansion. Whatever was considered to be convenient during early stages of the process, turned later into adverse variables for the natural development of the market. In this sense, the number of BC increased from 9.704 in December 2010 to 95.730 in December 2014, but the growth of number of transactions and transaction volumes decreased between 2013 and 2014, from 44% to 37% for number of transactions and from 40% to 37% for transaction volumes (BdO, 2014).

On the other hand, it must be mentioned there is an absence of studies on the criteria banks employ for selecting retailers to turn into BCs, as well as on the allocation of the services these correspondents shall offer. This becomes relevant as the service portfolio delegated to BCs affects the performance of these at individual and general levels, in turn affecting the long-term sustainability of the channel. As a result, the BC channel does not currently offer service portfolios that are suited to the communities' local demand and needs, explaining these inefficiencies in terms of number of transactions (BdO, 2013).

This underperformance affects not only banks and network integration companies managing the channel; it also has direct consequences on the particular retailers that perform as BCs. Then, a standardised procedure that helps banks to expand their networks to remote regions while maximising their profits, improving their overall performance without State assistance, is needed to ensure the long-term sustainability of the channel. In order to solve

this need, it is stated that the problem exposed belongs to the family of location-allocation problems.

In a typical location-allocation problem, four main decisions have to be taken: (a) location of a new facility to be opened; (b) changes in the existing facilities such as expansion, contraction or closure; (c) identification of supplier sources, and (d) allocation of products or services (Georgiadis, Tsiakis, Longinidis, and Sofioglou, 2011). For this research, the location-allocation problem to be solved consists of correctly selecting the retailers that will become BCs under a specific delegation model, as well as that of allocating a service portfolio that meets both the transactional and general capabilities of these retailers and the transactions of potential customers. This, while assuming the number of transactions for financial services to be random, and a series of restrictions coming from banks and retailers.

### **Purpose of the Study**

This research aims to promote financial inclusion in Colombia, through the development of a model formed by five stages: (a) the development of a taxonomy on network integration models and financial services; (b) the development of a taxonomy on the strategies of small and medium retailers that could be selected as banking correspondents; (c) the validation of both taxonomies through cluster analyses; (d) validation of the resulting classifications through an ANOVA and a Kruskal-Wallis H test; and (e) the elaboration of a chance-constrained programming model, which allows the selection of retailers feasible to become BCs under a specific delegation model selected, as well as an optimal allocation of a service portfolio designed to maximise the number of transactions, while taking the existence of stochastic transactions for financial services and the restrictions of the retailer into account. In order to conduct this development, it is required to analyse the existing relationship between the allocated service portfolio and the type of retailer, while considering the restrictions corresponding to the different delegation levels defined for delivering services.

Since the selection of BCs and the allocation of service portfolios is currently managed by banks without allocating optimal service portfolios, this research is meant to propose a standardised model to select the locations for new BCs from a set of feasible retailers, to associate them with selected integration network models, and to define particular service portfolios that maximise the number of transactions of BCs, after gaining a greater understanding of the channel in Colombia. It is aimed that these BCs reach the number of transactions and transaction volumes that enable appropriate dynamism and self-sustainability. All of this while considering stochastic transactions for financial services, and a set of constraints associated with banks and retailers.

### **Significance of the Problem**

The World Bank (WB), the International Monetary Fund and the Organisation for Economic Cooperation and Development, have designed strategies aimed to achieve constant growth rates for developing countries. One of these is the increase of financial inclusion. Worldwide, that category is understood as an alternative to achieve higher levels of economic development and growth for the countries.

This process of access and use of banking services is known as bancarization, which is the process of giving people who have been historically excluded of the financial system the possibility to enter and enjoy its benefits. One of the ways to promote such access consists of the establishment of banking correspondents, in zones where financial services have not been able to enter due to certain conditions of poverty and exclusion; because of this, financial inclusion and bancarization generate positive effects in the reduction of social gaps and poverty, due to savings and better resource allocation and distribution (Sanguinetti, 2011),

Against this, it can be proved that Latin America possesses low levels of bancarization when compared to both high-income countries, and countries with similar income levels:

“...the problem of access encompasses a wide population block, and it is not an exclusive



problem for the poorest sectors in each country” (Sanguinetti, 2011, p. 21, translated from the original Spanish). Thus, it is important for the region as a whole to increase the number of people with access to financial services, therefore advancing on financial inclusion for its population, as multiple examples throughout the region have shown (Armijo, Reséndiz, Ruiz, Vite and Apáez, 2011).

More specifically, there is an evident need to review and redefine the business model, through which it is possible to develop an attractive service portfolio for the lower income population in Colombia and this way increasing the transactionality to adequate numbers that boost the channel, in which the characteristics of the products that might be demanded by some of the poorest population groups are taken into account.

In this sense, Ivatury and Mas (2008) affirmed that it is costly for banks to implement and maintain this activity when the deposit and transaction amounts are low. Therefore, in order to achieve an efficient model, a value proposition to customers must be developed, especially aimed to those with lower incomes, thereby allowing these communities to make use of the formal financial services, and so ensuring the channel possesses natural market drivers.

For this reason, the reality and an assessment on the prospects of this model must be studied, since the expansion of BCs would otherwise be threatened by the absence of an optimal service portfolio. About the reality of the BC model, it is important to understand the risks involved in the transformation of a retailer into a BC. On this subject, Citi Foundation (2012) concluded in a study about the development of the BC network in India that:

The fear of high operational risk in the form of deviation from acceptable norms, frauds and misappropriation were another major factor which was inhibiting more products from being offered by the Banks. The BCs do not feel that they are running a mini bank and are not putting robust systems, procedures and supervisory mechanism

in place to prevent/manage operational risk. The low return from the operations was probably one of the inhibiting factors in making investments by the BCs in this crucial area. (p. 5)

Thus, it is necessary to standardise the selection criteria for the retailers optioned to become BCs, aiming for these to reach the number of transactions and transaction volumes that provide them with an adequate dynamism, which lowers its reliance on governmental transfers and subsidies, and thus avoiding that the governmental financial inclusion project becomes threatened.

Additionally, the study is intended to close the gaps on literature for Colombia, since the studies that serve as background to the current research were conducted in other nations (Jayo et al., 2011; Ramakrishnan, 2010); this makes it necessary to adjust those contributions to the Colombian reality. Even more so after taking into account the need to increase the academic research on the channel since, despite the significant growth and large market share of the channel, the research conducted has been scarce so far. Additionally, such studies are mainly reports or working papers of financial or regulatory institutions, addressing issues such as coverage, descriptive diagnoses, number of transactions and transaction volumes (*Asociación de Bancos del Perú* [Peruvian Bank Association] Asbanc, 2012, 2013; Ramírez, 2012); however, the studies of academic character are few (Mas, 2008; Mas and Siedek, 2008; Oxford Policy Management Ltd, 2011).

Against this, it is required to: (a) incorporate the capabilities of retailers to the analysis of BCs, which were approached from the functional and business strategies as performed by Ramakrishnan (2010), in which retailers were classified, by taking these factors into account; and (b) identify the factors that allow aligning the competitive strategies of the parties, while taking into account the differences between network integration models and service portfolios (Jayo, 2010). At this point, it is important to highlight the relevance of characterising the

partial delegation model, which was not addressed by Jayo et al. (2011) by not having empirical information on it available, which became a limitation for the analysis of the channel in Colombia.

Also, banks could identify integration practices that fit best into service strategy, able to be implemented in the BC channel, or even identifying possibilities for some other activities to be fully delegated and running others directly. Postal operators will be able to understand the opportunities to complement their portfolio, and offer innovative products and services in line with their capabilities. Finally, it must be noted that after the selection of feasible BCs, it is possible to facilitate the development of other associated channels such as mobile banking, which also have a positive impact on financial inclusion.

Summing up, it must be noted that given the realities for BCs in Colombia, the study developed by Jayo et al. (2011) on BCs in Brazil shed light into the characteristics of the channel in that country, which turned out to display similarities to the features of the BC channel in the Colombian context. This facilitates the proposition of a solution that favours sustainable growth for the BC business in Colombia.

### **Nature of the Study**

The current research followed an explanatory nature, as it possessed both a quantitative and a qualitative component. The first component of qualitative nature sought to explore the particularities and give an account on the features of retailers and banking correspondents in Colombian urban zones, by elaborating a taxonomy. Meanwhile, the quantitative component employed the positivist knowledge paradigm by recurring to cardinal and ordinal variables, which enabled establishing quantitative relationships between multiple retailer features and banking correspondents.

Also, this research followed a deductive logic as it relies on a theoretical framework based on the theory of the firm and agency theory, which is later adapted to the banking

sector and service delegation to banking correspondents. The former was made through the exposition of a set of hypotheses and propositions, and the verification of these was conducted through a field work by applying a survey at the borough of Suba. Such study displays a cross-sectional nature, as survey deployment was conducted a single time.

The nature of the study was defined as such in order to develop a model that will assist the main parties at the management of BC network integration, for the selection of feasible retailers and their future role as BCs under a specific delegation model and the allocation of a service portfolio, thus delivering the definition of an adequate service portfolio that enables to develop the BC channel in an optimal way, given a set of constraints associated with banks and retailers.

To develop and create said model, due to the lack of information on the channel and the involved parties, a subset of five stages had to be carried out. The first stage consisted of a taxonomy intended to identify each of the BC network integration models in Colombia, through the identification of the activities associated with the management of these BCs, by banks and network integrators (Jayo et al., 2011). A by-product of this first taxonomy is another one aimed towards characterising the groups of financial services in Colombia, by identifying the drivers that led to the development of the BC channel in the country (Jayo et al., 2011).

The second stage was the development of a taxonomy that sought to define the strategies followed by small and medium retailers in Colombia through the study of functional and business factors (Ramakrishnan, 2010). Next, the third stage consisted of the application of two *cluster analyses*. The first one parted from a classification of types of small and medium retailers, according to their functional and business strategies, which made use of a random sample following the development of Ramakrishnan (2010). From this stage, it was

expected to obtain the profiles for retailers according to the strategies adopted by these during their functioning.

The importance of classifying retailers is derived from the recognition of the heterogeneity on their capabilities, which in turn delimit the activities that they are able to perform. As indicated by Richardson (1972), “organisations will tend to specialise in activities for which their capabilities offer some comparative advantage” (p. 888). According to this approach, the division of labour between firms is derived from the specialization of companies based on their capabilities (Jacobides and Winter, 2012). Even though BCs could be deployed on all Colombian retailers, their feasibility depends on the adequate allocation of the service portfolio. In order to improve the transactional level of BCs and following the approach of Richardson (1972), it is necessary to identify the capabilities of each retailer, as these determine the allocated service portfolio. As pointed by Jacobides and Winter (2012), capabilities define “what an organization can actually do” (p. 1366).

Meanwhile, the second cluster analysis classified financial services by using a convenience sample and taking the study of Jayo et al. (2011) as a starting point. Through this, the relationship between groups of financial services and BC network integration models was analysed. This was done in order to gain a better understanding on the functioning of the channel in Colombia.

The fourth stage was intended to validate the results obtained from the clusters on retailers and service portfolios prior its use on the design and formulation of the chance-constrained programming model, through an analysis of variance (ANOVA) and a Kruskal-Wallis H test, where applicable. This stage sought to prove the existence of relationships between the groups of retailers and the groups of service portfolios that were identified and, in turn, testing whether these constitute a differentiator when evaluating BC performance, the latter being measured as the number of transactions performed by these correspondents.

Finally, the fifth stage corresponded to the programming of a chance-constrained programming model towards a maximisation that solves the location-allocation problem, making use of the parameters and restrictions derived from the previous stages.

### **Research Questions**

The following research questions are proposed:

1. How could a bank select retailers to become banking correspondents and allocate a service portfolio to these given a particular set of restrictions associated with the latter?
2. Which are the main criteria for the analysis by the banks of retailers poised to become banking correspondents in Colombian urban zones?
3. Is the type of retailer a relevant differentiator for the transaction volumes of these?
4. Is the type of service portfolio allocated to banking correspondents a relevant differentiator for the number of transactions performed by these?
5. Are the type of retailer and the type of service portfolio interrelated when analysing the number of transactions of banking correspondents?

### **Hypotheses and propositions**

As the current study included both a qualitative and a quantitative component, it was intended to formulate hypotheses that seek to solve the research questions, according to their nature. Thus, propositions sought to solve complex questions with a mainly qualitative nature, while hypotheses sought to answer closed question that enquired on the relationship between a quantitative variable and a qualitative one.

For the first question: *How could a bank select retailers to become banking correspondents and allocate a service portfolio to these given a particular set of restrictions associated with the retailers?* the following propositions were put forward:

P1: Banks can select banking correspondents and allocate a service portfolio while maximising channel profits through a chance-constrained programming process.

P2: The chance-constrained programming process seeks to maximise channel profits while taking into account the constraints in costs, capabilities of retailers and internal goals of banks.

Now, on the secondary question: *Which are the main criteria for the analysis by the banks of retailers poised to become banking correspondents in Colombian urban zones?* the following could be proposed:

P3: A taxonomy provides information on the attributes to be employed for the classification of retailers in Colombian urban zones, by defining the functional and business strategy items applicable to the analysis in the country.

P4: A taxonomy provides information on the attributes to be employed for the classification of banking correspondents in Colombian urban zones, by giving information on the main actors and multiple business models at the channel.

P5: A taxonomy provides information on the services offered by banking correspondents of multiple banks in Colombian urban zones, by incorporating information retrieved from actors involved in channel operation.

On the third question: *Is the type of retailer a relevant differentiator for the transaction volumes of these?* the following hypotheses were put forward:

H0 (1): The transaction volume of retailers is the same for all types of retailer.

H1 (1): The transaction volume of retailers varies according to the type of retailer.

On the fourth question: *Is the type of service portfolio allocated to banking correspondents a relevant differentiator for the number of transactions performed by these?* the following hypotheses were put forward:

H0 (2): The total number of transactions of banking correspondents is the same for all types of service portfolio delegated by banks.

H1 (2): The total number of transactions of banking correspondents varies according to the type of service portfolio delegated by banks.

Finally, on the fifth question: *Are the type of retailer and the type of service portfolio interrelated when analysing the number of transactions of banking correspondents?* the following hypotheses were proposed:

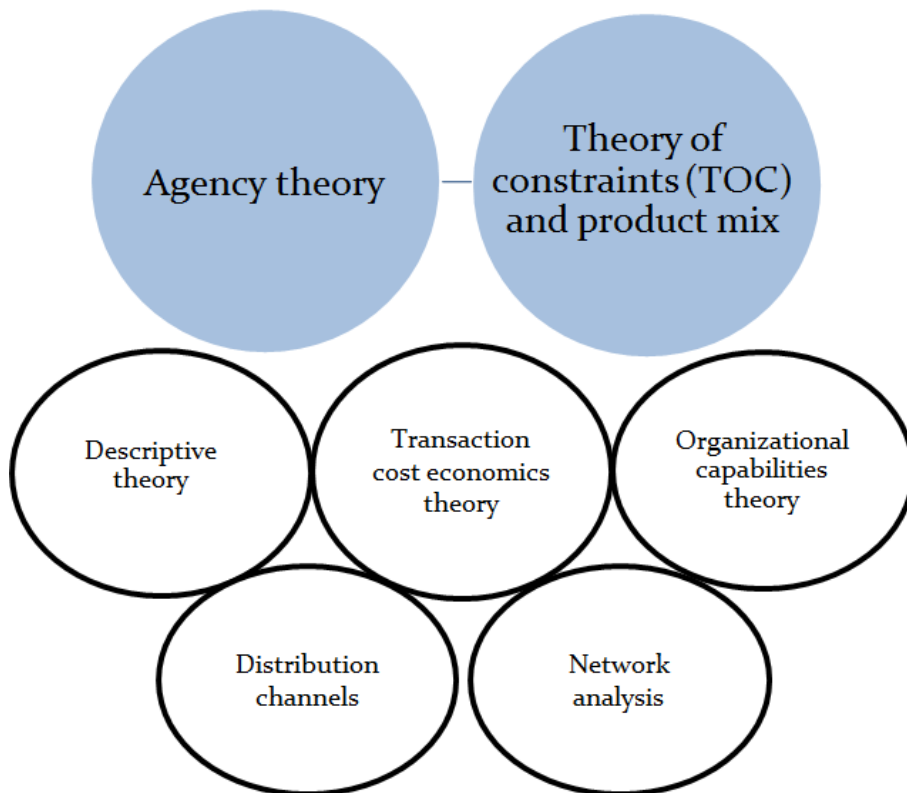
H0 (3): The type of retailer and the type of service portfolio do not interrelate with each other when analysing the total number of transactions of banking correspondents.

H1 (3): The type of retailer and the type of service portfolio are interrelated with each other when analysing the total number of transactions of banking correspondents.

### **Theoretical Framework**

The theoretical framework for the current research makes use of seven theories in total, two of these being defined as the main ones since they serve as a basis to approach the research problem in a general manner, while the other five theories serve as secondary theories that complement and deliver a framework for a more detailed analysis, as shown by Figure 1.





*Figure 1* Theoretical framework structure

From a general outlook, the agency theory serves as the first main theory, since it generates a contribution regarding the understanding of relationships and interactions between all agents involved at the BC channel, including: (a) banks, (b) network integrators and (c) retailers acting as BCs, where the principal-agent relationship is forged between banks and retailers, or network integrators and retailers. The theory of constraints (TOC) constitutes the other main theory for the current research, as it gave elements for incorporating constraints into the quest for optimising the profits of the BC channel.

On the group of secondary theories employed for a more detailed analysis, it is possible to find the organizational capabilities theory, given that retailers and its capabilities are the starting point of this study. Next, the distribution channels theory is introduced to formalise the functioning of the channel. Also, some work performed on network analysis is introduced, to gain a better understanding of the interrelations between stakeholders involved in the business. It is followed up by the descriptive theory, which was mentioned as it

contributes for the process of taxonomy design and the classification of BCs in Colombia. Finally, the transaction cost theory allows understanding the dynamics behind the channel operation, as well as positioning itself as a determinant for the delegation levels. With the above, it is possible to start the detailing for each of these theoretical contributions.

### **Agency theory**

In the literature of the agency, transaction costs emerge due to diverging interests of information between contracting parties (Jensen and Meckling, 1976). This implies that agents do not act in order to maximise profits for the principal, unless an appropriate governance structure is implemented to safeguard the interests of said actors (Jensen and Meckling, 1976). The design of incentive contracts can align the goals of principals and agents, and thus mitigate opportunistic behaviour, increasing transactionality (Sappington, 1991).

Williamson (1985) mentioned that the interests of the principal will be safeguarded only when agents share these interests, which is achieved through a properly designed compensatory incentives plan. Therefore, the agency theory specifies the mechanisms through which the losses for the actors involved are reduced (Eisenhardt, 1989). Thus, this theory is useful in order to solve problems that might show up in the context of contracts between the parties in the best manner. In turn, this scenario becomes more complex as both have different goals and imbalanced risk aversion, leading to take different actions (Eisenhardt, 1989).

At the current study, the notion of “agency relationship” is structured to define the nature behind the relationship between banks and BCs. This notion is taken from the legal analysis, in which it labels a relationship in which the principal holds the power to control and manage the agent’s activities. This is supported on the rational choice theory, with a special interest on contract optimality in situations of informational asymmetry, where the goal of the firm or its managers is reduced to profit maximisation for the group or principal. However,

the hypothesis of opportunism forces to recognise that agents will do anything they can to capture value for themselves, thus forcing the principal to design initiative contracts able to reduce conflicts of interest as much as possible (Fama and Jensen, 1983; Williamson, 1985).

Meanwhile, Aubert, Rivard, and Patry (1996) argued that agency theory displays a close relationship with the costs of governance, such as monitoring the employee, costs of aligning targets between the employee and the principal, and residual losses. The scenario explained above is the one that leads this theory being taken as a main theory, interrelated with and complemented by two other ones expanded upon throughout the section: descriptive theory and transaction cost theory.

### **Theory of constraints (TOC) and product mix**

The TOC stipulates that every organisation must face a set of constraints that difficult the maximisation of the performance associated to a defined goal (Spector, 2011). Given the existence of these restrictions, Spector (2011) defined a five-stage model in order to maximise the performance of a system under constraints. The stages are: (a) identifying system constraints, (b) deciding how the system constraints will be exploited, (c) subordinating the system to the constraints, (d) identify system constraints, and (e) if, in the previous stages, a constraint was broken, going back to step (c) but not allow inertia to become another constraint (Spector, 2011).

One of the applications given to the TOC can be found in the field of product mix (Cannon et al, 2013; Lee and Plenert, 1993; Mabin, 2001). Regarding the product mix, Cannon et al. (2013) stated that “the constraint-based approach addresses the fact that actual resource availability and demand inevitably deviate from plan, thus creating constraints that a company must address by adjusting the product mix to maximize profit” (p. 630).

Even though TOC saw the manufacturing sector as its main field for application, Siha (1999) delved on the importance of its application in the service sector:

There are two issues that TOC deals with in manufacturing that are also of importance in the service sector. The issues are, maintaining short-term operations as close to maximum performance as possible (logistics) and, improving long term maximum performance (continuous improvement). The underlying idea of TOC is that constraints, by definition, limit the performance of any system. An addendum to this idea is we can only get continuous maximum performance from a system by driving the system against its constraints. We should be aware that we might not be able to drive a system against all its constraints simultaneously. (pp. 257-258)

This theory is relevant for the current work, as it was sought to optimise a target function while considering a set of constraints. This was done in order to select a retailer as a BC, followed by the allocation of a service portfolio and a particular BC network integration model. Because of this, the TOC allows to deliver a response to the first research question, *how could a bank select retailers to become BCs and allocate a service portfolio to these given a particular set of restrictions associated with the latter?*

### **Descriptive theory**

Analytical theories are the most basic theories, as these describe and allow to classify the specific dimensions or characteristics of subjects and situations; thus, these establish the “what is” (Gregor, 2006). So, this theory is necessary when knowledge about a phenomenon is scarce (Fawcett and Downs, 1986). Likewise, based on the above, it is possible to develop sorting processes, which have the following variants, in turn: (a) classification scheme, (b) frames, and (c) taxonomies. Against this, it was mentioned that the advantage obtained by the classification lies in the facility for identification and comparison of phenomena (Gregor, 2006).

At this point, it is worth mentioning the work performed by Jayo et al. (2011), in which a distinction between the activities of the main parties in the BC network integration

management was developed, splitting them into two main categories: (a) business process activities including contract of places, contracting matters, and risk management; and (b) technical and logistic activities, these referring to the installation and provision of infrastructure, training and help-desk.

Based on the differentiation explained above, Jayo et al. (2011) proposed a taxonomy of integration models for BC networks, parting from the degree of delegation of the two aforementioned activity categories, between banks and network managers. From there, the following delegation types were obtained: (a) full delegation, in which all business process activities or technical and logistic activities are outsourced to a network integration company; (b) partial delegation, in this the business process activities are performed by the bank, while the technical and logistic activities are outsourced; and finally (c) no delegation, in which all the activities are carried out by the bank, allowing the correspondent to provide facilities for operations only.

In this sense, the descriptive theory becomes an important input for answering the secondary question, *which are the main criteria for the analysis by the banks of retailers poised to become banking correspondents in Colombian urban zones?*, since the classification is performed through a taxonomy with a preliminary profiling of each retailer. Also, it is worth noting that the use of descriptive theory in conjunction with transaction cost economics theory reinforces the conceptual approach of this work. For that reason, the main role for this theory lies in exploring and describing how integration processes for BC networks occur, and how alternative forms of network integration relate to the group of services offered via BCs.

### **Transaction cost economics theory**

On the issue of BCs, both Jayo et al. (2011) and Mas (2008) conducted their research on the integration processes for this network, based on the transaction cost economics (TCE) approach. In turn, Williamson and Masten (1999) established that markets and firms are

different forms of organizations and decisions on integrating or outsourcing depend on the transaction costs.

Also, Williamson (1985) mentioned that this theory defines transactions as the transfer or exchange of goods and services through an organizational boundary. Based on this, the transfer of goods and services done internally by the firms is determined by the attributes of transactions, such as the monitoring and control costs (Jones, 1987).

Meanwhile, Jones (1987) defined the target of the transaction cost theory as identifying the source of the aforementioned costs. That is, those characteristics or dimensions of transactions that lead to exchanges becoming problematic. This explains how transactions lead to different governance mechanisms to manage those processes, while achieving a downscaling in these sources of cost increase. An example of this is that the theory of costs explains the decisions of firms to integrate vertically (Armour and Teece, 1978; Walker and Weber, 1984), or to create divisions based on the relative costs of the hierarchy against market changes.

So, there are two important factors that may increase costs under said theory. These are: the product and process complexity, and the specificity of the assets needed to run the business. Meanwhile, Williamson (1991) mentioned that the greater the need for specific assets by any of the parties, the higher the transaction costs, as the possibility of opportunistic behaviour from one of the parties is greater, and therefore there will be greater complexity in the contracts to be performed. This way, it is considered that the dangers of opportunistic behaviours can occur particularly when specific investment relations are involved.

On the other hand, Tirole (1999) said there are four factors preventing the use of complete contracts. Ex-ante: (a) there are too many contingencies to consider them all, (b) it is very difficult to estimate the probability attached to each contingency; ex-post: (c) contracts

could be very expensive to administer, and (d) legal costs may prevent one of the parties from going to court in order to enforce a contract being challenged.

Therefore, the transaction cost approach has often served to support studies on the contractual arrangements between the companies, as well as the role and extent of involvement in these agreements by government agencies (Williamson and Masten, 1999). Additionally, Aubert, Rivard, and Patry (2004) stated that uncertainty when writing the contract is the main impediment when outsourcing information technology in the banking industry.

This was described by Aubert et al. (2004), who reported that in order to make a better proposal, salesmen hide negative characteristics of their products, and buyers do not disclose how much they are willing to pay in return. So, both parties know that the other is behaving opportunistically, so everyone will have to take activities to obtain information, such as product testing or warranty requirements. However, actions allowing a wider spectrum of information generate an increase in transaction costs.

Another relevant aspect that must be taken into account when companies decide to go to the market is represented in idle resources or financial slack (Ang and Straub, 1998). For that reason, should the firm have idle resources, it tends to increase its scale and reach, investing in information technologies such as software, hardware, and human resources. However, when idle resources are low, firms tend to resist internalization due to anxiety caused by the loss of financial resources (Sutton and D'Aunno, 1989).

Going deeper on the issue, Aubert et al. (1996) considered another variable able to influence when deciding to outsource. Hence, low-frequency transactions are more inclined to be organised through the interaction with markets, i.e., outsourcing. However, when the parties constantly interact, it could be less expensive to design a governance mechanism more fitting to specific situations, i.e. internalisation.

Based on the above, the decision between internalising or outsourcing a process to third parties involves balancing the benefits and costs of integrating these processes (Grossman and Hart, 1986). Against this, Williamson (1971, as cited in Jayo et al., 2011) indicated that companies usually choose internalization in activities on which these can gain advantages and tend to outsource activities that represent disadvantages in costs; this does not only include the production costs, but also transaction ones, which in turn adds the costs of coordinating and monitoring third party activities.

Meanwhile, Saarinen and Vepsalainen (1994) mentioned that in the context of Information System (IS), a firm chooses to outsource or internalise based on the comparison between the costs of internalising, versus the price that must be paid to third party in order to get the same service. Facing the issue, Aubert et al. (1996) adduced that organizations planning to partially or fully outsource their information technology activities face two crises. One of them consists in deciding on the activities to be internally executed and which ones stand to be outsourced. The other relates to the management of the relationship created by the outsourcing, the definition of terms for the contract between the customer, the third party, and the principal of said contract.

Therefore, Ang and Straub (1998) deducted that when a firm has to incur into substantial efforts and costs to supervise and coordinate third party activities, these can conclude that outsourcing is very expensive. Regarding directly to internalization, issues such as the ability of firms to control information and ensure consistency between activities such as recruitment, resource allocation and communication constitute advantages of the internalization process; this way, economies of scale can be used to justify that process (Williamson, 1971, as cited in Jayo et al., 2011).

Also, Jayo et al. (2011) concluded that the complexity inherent to the coordination of activities such as employment, compensation, resource allocation, conflict resolution,



exchange and communication, should determine the organizational structure. Specialization and availability of suppliers, together with the related costs should also be aspects for firms to consider when evaluating the possibility of entering the market.

When bringing TCE to the financial sector it is important to remark what was articulated by Jayo et al. (2011), that is, transaction costs in the banking industry are those costs associated to the effort, time, search, creation, negotiation, monitoring and enforcement of contracts with other parties that erode the economy of production. In addition, Ang and Straub (1998) exposed the banks have been able to substantially reduce technology costs by reducing the costs of labour and equipment through outsourcing. In the same vein, Jayo et al. (2011) stressed that despite the existence of studies on the transaction costs involved in outsourcing decisions for the banking industry, there is a gap in the literature on organizational forms of branchless banking network integration.

### **Organizational capabilities theory**

In order to complement the transaction cost economics theory, the elements developed from studies on organizational capabilities were taken into account. The main elements of this theory are: the recognition of the heterogeneity at firms, the importance of organizational skills in the definition of results and the change (Jacobides and Winter, 2012).

From this approach, and faced with the same issue, the parties would take a different course of action according to their multiple capabilities. That is, the first steps taken by each party depend on their capabilities, when looking for a solution. As subsequent steps are related to the previous ones and these same capabilities, differences in the strategies of the parties increase during their search for solutions (Jacobides and Winter, 2012). Despite this heterogeneity, there are basically two homogenising forces. Imitation comes at first, which is the replication by an actor of a successful strategy developed by another: “as rivals imitate one another’s improvements [...] strategies converge and competition becomes a series of

competes down identical paths that no one can win. Competition based on operational effectiveness alone is mutually destructive” (Porter, 1996, p. 64). The second homogenising force shows an evolutionary appearance. From this approach it would be possible to observe the relative demise of those parties possessing lower capabilities in favour of the income and growth of the most capable ones. This way there would be a convergence of efficiencies, instead of strategies, since all of the latter proved to be efficient would remain (Jacobides and Winter, 2012).

From the point of view of the capabilities theory, the main limitation of the transaction cost economics theory is derived from the *ceteris paribus* clause, that is, the study of transactions without considering other factors:

This reliance on “*ceteris paribus*” presents an important issue to which we will return. It suggests that causal explanation derives fully from transaction attributes, as opposed to either the context that shapes transactional choices and menus or the organizational factors that drive the skills and competencies of a firm as both a productive and a transactional entity.

(Jacobides and Winter, 2012, p. 1368)

Even though studies on transaction costs have been developed in parallel with studies on organizational capabilities, a synthesis of both theories has been attempted to perform in recent years (Jacobides and Winter, 2012). From this point of view, the choice of a strategy by a company depends, among other reasons, on both the characteristics of the conditions in the transaction and the organizational capabilities (Jacobides and Winter, 2005; Madhok, 2002).

On the other hand, Eggers and Kaplan (2013) mentioned the evolution on the analysis of strategic management in recent decades, highlighting the importance acquired by two approaches: the focus on organizational capabilities, which shows that the existence of different capabilities for each company leads to different results, despite sharing the same environment, and the managerial cognition approach, according to which the interpretations

of managers determine how organizations respond to environmental challenges. Likewise, these authors mentioned how these approaches remained separate until recently despite their complementarity, a theoretical shortcoming that is being addressed in recent studies aimed to combine and simultaneously study both contributions to gain a better understanding of strategic management.

The aforementioned theories are relevant to the research as retailers were taken as the study unit for the current research, which places great importance in learning the capabilities these have at the time of becoming BCs, acting under an agency contract as a bank's extension to offer financial services. Due knowledge on how these capabilities are formed, will allow to know the causes behind the results and performance of an operation as BC.

### **Distribution channels**

A distribution channel is defined as the set of independent organizations involved in the distribution process of a product or service for use or consumption (Stern, Common, and Barbier, 1996). Therefore, the distribution channel can be classified according to the number of intermediaries involved: "level zero" direct channels, which are those not involving mediation, i.e., when a product or service is delivered directly by the producer to the consumer; "level one" channels, when an intermediary is involved, and "level two" channels, there are two brokers, and so on increases (Bowersox and Cooper, 1992).

In relation to this, Jayo et al. (2011) indicated that the problems in network integration have been studied as a topic by other authors such as (Lazzarini, Chaddad, and Cook, 2001; Omta and Van Rossum, 1999) who focused their studies on manufacturing industries. Also, they noted that generally, the distribution of services does not include as many intermediaries as product distribution, because the services are simultaneously processed and consumed. For this reason, in the case of the banking system, BCs are configured as the first intermediary channel used by banks (Cernev, Diniz, and Jayo, 2009).

An example in the application of these channels is Brazil, as this country developed a solution for the integration with intermediaries through BCs, consisting in the use of terminals based on the integration of information technology - based technology and installed in local stores (Jayo et al., 2011). Regarding the issue, Zambaldi et al. (2012) confirmed that the use of information and communication technologies contributes to the spreading of banking services.

In this manner, BCs can be based on different configurations between banks and other businesses of all types. The experience proved to be more successful in the last decade is based on the infrastructure of the information and communication technology, connected to various stakeholders involved in the networking arrangements needed to deliver financial services (Jayo et al., 2011).

Thus, in relation to the interconnection between customers and banking entities through these alternative channels, Prochaska and Brix (2008) mentioned that there are two approaches to information and communication technologies regarding integration: The former is the mobile phone network, and the latter is the one carried through Points of Service (POS) or personal computers. At this point it is important to highlight that the second channel type has been successfully used in Latin America, although it is possible to find both types in some regional countries (Ivatury and Mas, 2008).

As a closing remark, it is important to add that, as said by Mas (2008), in the banking context there are three elements that make up the channels: (a) stores easily accessible for low-income customers, (b) electronic payment infrastructure, and (c) a transactional account. Stores are external agents acting as intermediaries between customers and banks. The electronic payment infrastructure can be operated by the bank or by third parties. Finally, the transactional account is necessarily operated within the boundaries of banking institutions (Jayo et al., 2011).

This facilitated the delivery of an answer to the secondary question, *which are the criteria that influence the selection of a type of retailer associated with a service portfolio?*, by understanding the BC and its relationship with both network managers and financial institutions, it is possible to determine which delegation type is the most adequate, in order to optimise the service portfolio and therefore the number of transactions.

### **Network analysis**

As a complement, the network analysis is taken, because this tool makes it possible to emphasise the importance of interdependence among firms and the inter-organizational relationships that can be a source of competitive advantage (Dyer and Singh, 1998). Similarly, Powell (1990) mentioned that the network analysis is not particularly interested in understanding the relationships between organizations in a vertical way; on the contrary, its interest is focused on horizontal relationships that firms possess with particular groups or industries. This is fundamental in order to understand the interaction between banks, coordinators or managers, and BCs.

Additionally, the network analysis is functional when mapping the structure of interorganizational relations based on the recognition of network restrictions (Burt, 1992; Granovetter, 1973; Nohria, 1992; Wasserman and Faust, 1994). Similarly, there are three elements that can be evaluated by network analysis, which are: the social structure, learning, and externalities of the BC. The analysis of social structure allows understanding how interpersonal relationships and network positions are occupied by agents, individual or collective influence, behaviour and performance (Lazzarini et al., 2001). On the other hand, the learning process is carried under two different types of processes related to value creation, each of which has different consequences. The first consists in that knowledge diversity is beneficial, as it generates positive externalities on multiple agents through the dissemination of knowledge improving the innovation opportunities (Feldman and Audretsch, 1998; Kogut,

2000). The second one involves joint efforts to create and refine a certain body of knowledge; this type of learning tends to induce co-specialised knowledge, i.e., skills that are dedicated to agents participating in a given exchange (Poppo and Zenger, 1998).

Finally, network externalities occur if the benefits when adopting any technology or contract type grow with the expected number of adopters, which induces incremental returns to adoption (Arthur, 1989). Finally, Omta and Van Rossum (1999) mentioned that in networks theory, the collaboration modes are not based solely on economic motivations, as power and trust are key concepts in this approach. Thus, the actors in these networks think they act according to their functional role, but the goal orientation, interest, rules, and power relations determine this role (Nooteboom, 1996; Omta and Van Rossum, 1999). The foregoing suggests that network analysis facilitates an adequate understanding of the processes related to the BC channel; for this purpose, it is viewed as a valuable tool for this document.

### **Definition of Terms**

*Financial inclusion* can be understood as a process seeking to link any type of person, either natural or legal, to the services offered by the financial sector. The most common tools for doing so are savings and credit, although other systems such as payments and withdrawals can also contribute to achieve the objective (*Asociación Bancaria y de Entidades Financieras de Colombia* [Colombian Banking and Financial Entities Association] Asobancaria, 2011). In a similar manner, bancarization makes reference to the level of access a population group has to various types of financial services, which are obtained through formal institutions (Saboin and Bello, 2009).

However, Vera, Hernández, and Osorio (2012) pointed out that the first problem encountered by an analyst when assessing the level of bancarization in a specific geographical area, is the selection of a comprehensive and accurate indicator. That is because what is

commonly measured is only one aspect or dimension of the phenomenon, for example: (a) measures of financial depth, (b) coverage measures, and (c) measures of intensity of use.

Furthermore, branchless banking was created with the purpose of increasing the previous two variables, this category referring to the distribution channels for financial services other than those covered by traditional banking, according to the Consultative Group to Assist the Poor (CGAP, 2010). It is worth mentioning that these, generally, make use of: (a) information and communication technology and (b) points of sale (POS) machines. An attribute of these services is the substantial reduction in costs for the end user, and the possibility to increase banking coverage without engaging in high levels of investment, through the existing infrastructure of multiple commercial parties. Thus, branchless banking:

a) permits the use of a wide range of agents outside bank branches, thereby increasing the number of service points, (b) eases account opening (both on-site and remotely) while maintaining adequate security standards and (c) permits a range of players to provide payment services and issue e-money (or other similar stored-value instruments), thereby enabling innovation from market actors with motivation to do so. (CGAP, 2010, p. 1)

Hence, when speaking of BCs, it is alluded to any third party acting on behalf of a financial institution, either through an agency, service, or similar agreement. It should be noted that banks are legally liable for the actions of the agents in most countries (Lauer et al., 2011). Also, BCs are legally defined in Colombia as third parties connected through computer systems, acting on behalf of the financial institution providing the operations authorised under the legal regime (Decreto 2233, 2006).

Now, it is possible to differentiate three *delegation type* models attending the contractual figure of the BC, namely: (a) *full delegation*, in which business process, technical and logistic activities are outsourced by the bank; (b) *partial delegation*, in which business

processes are handled by the banks, but technical and logistic activities are outsourced, and (c) *no delegation*, in which both business process as well as technical and logistic activities are responsibility of the bank, with no outsourcing (Jayo et al., 2011).

Additionally, it is relevant to clarify the concept of *service portfolio*. According to Kohlborn, Fiel, Korthaus, and Rosemann (2009), in general terms, it is understood as the set of internal and external services, business services, planned and existing services offered by an organisation. Similarly, it also contemplates services that are still undeveloped and in the process of being offered. However, for the purposes of the current research and making allusion to the financial sector as such, the concept of service portfolio proposed by Kumar, Nair, Parsons, and Urdapilleta (2006, as cited in Zambaldi et al., 2012) is taken, which is summed up as “an extensive service portfolio is offered by means of BCs in Brazil, including payments, account openings, deposits, transfers, withdrawals of social benefits from governmental programs, and even loans” (p. 6).

Likewise, it is pertinent to understand the following two terms, as these are relevant to the current investigation. First, the concept of *feasibility* appears, which was defined by Kumar and Kumanan (2012) as the viability of the location of a future industry. The former matches the purpose of this variable to positively affect the obtention of the company goals.

Finally, as the second term, Teece and Pisano (1994) understood the term *capabilities* as “the key role of strategic management in appropriately adapting, integrating, and reconfiguring internal and external organizational skills, resources, and functional competences toward changing environment” (p. 538). The former term is relevant for performing the characterisation of retailers that can be turned into CB.

### **Assumptions**

The only assumption says that transaction numbers for financial services provided by the BC channel behave stochastically. More specifically, this assumption was performed



based on experience originating from the author's professional experience, where it was noted that banks believed that transaction numbers followed a normal distribution. Said assumption was tested for the current study, following a Box-Cox transformation using a lambda of 0.2104181 and cutting out retailers with transaction levels lower than a level considered to be interesting for banking correspondents, while also eliminating those with upper levels that could be thought of as outliers.

Both the Jarque-Bera and Pearson's chi-square tests for normality did not reject the null hypothesis of normal distribution for this data. This situation hinders the estimation of the transactions for the services a BC could offer. The assumption is related with the main objectives behind the development of BC networks in Colombia, and is also expanded along the document.

### **Limitations**

First, the current study is limited to a simple of 282 retailers that agreed to participate in the survey created for the research. Out of these 282 retailers, 106 were banking correspondents in turn; on the other hand, this survey was conducted during July 2014, this month serving as a time horizon. Since data was collected a single time, this research was defined to be a cross-sectional study (Hernández, Fernández, and Baptista, 2010).

### **Delimitations**

The country selected for the application of the study was Colombia, after taking the surge observed in the number of BCs in that country into account; however, the study does not include the analysis on the channel status for other nations that also showed a significant surge in the business, such as Mexico and Peru. Future researchers are invited to continue the analysis of the channel in other latitudes, where the formulation of propositional works in order to increase the expansion of the BC channel and financial inclusion is required.

The sample was taken from BCs located in urban areas, specifically the influence zone of Bogotá, Colombia, which constitutes a limitation regarding the study of BCs in rural sector and smaller cities. For this, it is highlighted that future stages of this research shall expand its reach to these locations. In the meantime, the delimitation to urban areas was put in order to create an initial analysis of the channel in the country, given the greater dynamism of urban areas. An analysis on rural areas would be left for future research.

Bogotá was selected due to two factors: first, it is the largest city in the country, with a gross domestic product equivalent to 24.87 % of the Colombian total in 2014 (Departamento Administrativo Nacional de Estadística [DANE], 2014). Second, it is the main receptor of internal migration in Colombia: at the first semester of 2003, net immigration to the city totalled 2'117.570, and 39 % of its population was born outside the city (Departamento Administrativo Nacional de Estadística [DANE], 2003). Therefore, it could be considered a representation of the urban zones of the country as a whole, which comes in handy given time and resource constraints that preclude any attempt to perform a national deployment yet.

Initially, the chance-constrained programming model was run on retailers located at the borough of Suba, in Bogotá, Colombia. When banks and network managers are selecting retailers to open as BCs, their initial need lies on delimiting a small subzone inside the city, in which retailers are evaluated and selected according to their criteria. At the moment of applying the model, a similar requirement showed up.

The borough of Suba, in Bogota, was chosen for the sample because of its demographic particularities. According to data of *Secretaría Distrital de Planeación de Bogotá* (SDP, 2011), it is the most populated borough in the city. Plus, it is one of the few boroughs with all six socioeconomic strata, and it was the one that showed a distribution most similar to that of Bogotá as a whole as is shown in Table 1 (SDP, 2011).

Table 1

*Share of socioeconomic strata*

Location	No Stratum	Stratum 1	Stratum 2	Stratum 3	Stratum 4	Stratum 5	Stratum 6
Suba	1.69%	0.26%	37.70%	35.61%	14.29%	9.58%	0.88%
Bogotá	1.64%	9.45%	39.36%	35.73%	9.46%	2.62%	1.74%

Note. Adapted from *Vivienda, hogares y personas por estrato* by Secretaría Distrital de Planeación de Bogotá, 2011.

On the variables delimiting the study, four main variables are taken, with three independent variables and a single dependent one. The dependent variables were (a) the number of transactions allocated to the retailer opened as a BC inside each specific portfolio, (b) the portfolio allocation for each retailer opened as a BC under a given delegation model and (c) the selection between a universe of feasible retailers that could be opened under a specific delegation model. Meanwhile, the profitability of the channel serves as the dependent one.

### Summary

Sanguinetti (2011) reviewed how, in some countries, there have been developments in innovative ways to promote financial market growth, inclusion and access of large population groups historically marginalised from the banking system. Faced with this, the author highlighted the role of the channels composing branchless banking, among which the BC channel can be found.

In turn, Ivatury and Mas (2008) defined BCs as a medium that enables low-cost banking operations, whereby the *Federación Latinoamericana de Bancos* [Latin American Federation of Banks] (Felaban, 2010) pointed to the importance and rise of BCs around the world, highlighting some experiences in Latin America. The former has impacted not only on the expansion of BCs, but also on the research and studies about the subject.

This way, an important reference to understand and describe the functioning of the channel lies on the study developed by Jayo et al. (2011), in which a description for the BC model was obtained for the Brazilian case, by taking variables such as service portfolio and delegation types into account, in order to create a taxonomy for BCs that constitutes a contribution to the literature, because of both the BC classification performed and the detailed description developed by the authors on the variables to be measured.

Additionally, other factors that were taken into account are the functional and business strategies, following Ramakrishnan (2010), as well as banking segments, the types of customers, users and the location of the retail outlet, during the development of a taxonomy on retailers. The former in order to provide a study that, parting from the identification of the actual status of the business for Colombia and the multiple involved parties, understands the agency relationship existing between the parties involved in the channel such as banks, network managers and retailers acting as BCs, as to identify the capabilities each of these parties hold at the time of designing the business model relationship to operate the BC channel.

This is how the current study seeks to analyse the relationship between these variables, as a previous step for the final goal of developing a method to solve the location-allocation problem associated with the expansion of BC networks to allow BC channel development and thus the fulfilment of its role as a bancarization agent, through supporting the banks and integrators during the selection of retailers, from a set of feasible ones, to operate as BCs under a specific delegation model, and on the allocation of a service portfolio intended to maximise the number of transactions of BCs and, therefore, channel profits, under constraints in retailers' capabilities, while assuming a stochastic transactions for banking services at BCs. Besides the gaps in the literature, it is preponderant for the academia and other stakeholders to combine efforts in order to increase the research about the channel.

## Chapter 2: Review of the Literature

Financial inclusion has a positive effect on the struggle against social inequality, exclusion, and poverty. Yokomizo, Diniz, and Christopoulos (2010) highlighted the importance of bancarization as a tool for generating social inclusion, combating inequality, promoting the role the financial sector can perform through the increase of its physical presence, and improving access to credit.

Sanguinetti (2011) claimed that countries can promote economic development by implementing financial inclusion policies, as banks play the role of resource allocators, which allow encouraging entrepreneurship in previously excluded population aggregates. The author also mentioned that limitations in access to financial services put countless families around the world in disadvantage; however, most of these are concentrated in developing countries where coverage of these entities is limited.

For that reason, the BC model has positioned as a viable alternative to increase coverage and access to these services, during the last decades. According to Felaban (2010), the global increase in the number of BC is owed to the fact this business has become an important way to increase bancarization, since it has made possible to include families living in remote locations or low income levels through the use of these.

On the issue, Mas (2008) mentioned that the channel was first implemented in Latin America, Africa, and some Asian countries, where it improved the distribution of financial services for its inhabitants. Also, it must be noted that, according to this author, banks can expand their market through BC with low investment amounts. Thereby, it is important to increase the studies and research on BCs in parallel to the rise of this phenomenon, since although several parties have been benefited by this channel, the channel performance is far from optimal.

Therefore, a review of literature was developed in order to observe the current status of the BC business, for both the country to be studied (Colombia) and the regional pioneer (Brazil), as well as spotting the main problems associated with the channel in Colombia. For this, studies on the products offered through the channel were taken into account. Afterwards, customer choice criteria on the selection of retail banks, as identified by multiple works on the subject, are introduced; followed by a revision on literature relating agency theory and banking performance.

In the same vein, a review of literature of studies analysing estimations on the portfolio for financial services was displayed next, followed by a review of literature on the management of the BC channel. Next, as the unit of analysis for this research consists of the retailers, studies focusing on their capacities are exposed. Finally, a review on the documents from which the methodologies employed in the current research were identified, and thus helped determine the relevant variables to attain the research goals from the same.

### **Status and Main Problems of the of BCs in Brazil and Colombia**

Diniz (2010) described the BC channel in Brazil, and identified potential synergies able to be obtained between the channel and microcredit. Thus, the central problem in his research was to find the relationship between the rise of the channel in that country, and the potential expansion of the microcredit market. This way, the author remarked that both BC and microcredit developed in parallel, but in separate distribution networks and companies. That led to microcredit institutions not having the reach of BCs, and a negligible credit volume in the latter.

Against this background, Diniz (2010) proposed the following objectives: (a) knowing the operation of BC and its relationship with banks, considering business models, infrastructure, and technology required to operate; and (b) exploring the potential and

limitations of BC in terms of the provision of microcredit, followed by proposing some actions for the integration of both businesses.

In order to achieve those objectives, Diniz (2010) conducted an empirical analysis looking for information on (a) relevant social groups, (b) technological perspectives, and (c) technologies-in-practice. So, through a series of interviews and by taking the entities involved in the micro-credit and BC businesses in Brazil into account, the author proceeded to measure the reach of each entity to enter said markets, as well as the prospects for the combination of these in the future.

Finally, the author pointed to the importance of bringing the microcredit market closer to BCs, in order to bring dynamism to the channel. Therefore, the relevance of this study lies in the detail shown in the descriptions of the investigated institutions, historical periods, and the parties involved in both the microcredit market and BC in that country (Diniz, 2010; Jayo and Diniz, 2009).

Meanwhile, Jayo (2010) performed a study of the channel in Brazil, by employing a multilevel model composed of multiple stages, specifically a literature review, interviews, characterisation and taxonomical construction of the studied phenomena. Likewise, that study was based on three theoretical approaches: (a) a structuralist view, focused on the analysis of the technological structures and agents; (b) social shaping of technology or technology as the result of interactions between different agents, from this the ideas of relevant social groups, technological frames and negotiation processes are derived; and (c) the contextualist view, comprising technology implementation processes according to the historical context, thus highlighting the importance of the environment, process, and content.

Based on this, Jayo (2010) began the taxonomical process on the BC channel in Brazil, confirming the existence of the most relevant actors to implement BCs in said country. Among these, the author found four parties: (a) banks, (b) microfinance institutions, (c)

technology providers and (d) businesses to be linked. But, he stressed that each of these have different interests and views on the implementation and benefits, which might lead to risky divergences for business development. In this manner, the negotiation becomes important to resolve such discrepancies (Jayo, 2010). Finally, the author stated that the growth and expansion of the channel for the Brazilian case happened during the late nineties, given the positive impact of BCs to reach expensive, hard to reach regions.

Subsequently, Jayo et al. (2011) expanded the study on the status of the BC channel in Brazil. Initially, the authors stated that the use and acceptance of the channel have increased during the last decades, which led to the increase in the literature about it. This way, Jayo et al. (2011) argued that this channel integrates various company types including banks, retailers and other networks associated to the business operation. However, and:

Despite the number of studies covering the correspondent model, there is a clear research gap in the literature: the network integration process and its structuring role in defining the extent and profile of services offered through the channel still deserve attention. Thus, one important question still not answered about correspondent banking business is the relation between different approaches for organizing the channel in terms of network integration process and the different banking services offered for each one of them. (Jayo et al., 2011, p. 2)

Parting from the identified research gap, Jayo et al. (2011) developed a taxonomy for the BC networks and the delegation types, according to which the business process, technical and logistic activities were distributed between banks and network integrators. These models were classified into three classes, namely: (a) full delegation, (b) partial delegation, and (c) no delegation. However, Jayo et al. (2011) did not study one of the evidenced delegation types (partial delegation), which shows a gap in that study. Additionally, the authors understood



partial delegation as a unique universe, while this type of delegation is divided under multiple subtypes of delegation, as it will be expanded upon during the following pages.

Likewise, the authors identified the relationship between BC network integration management models and the service portfolio offered by BCs. Through this, they suggested that increased internalization of the business positively affects both the volume of operations and the diversification of the service portfolio. “That is to say, the less ‘delegated’ the network integration model is, the wider will be the expected range of services delivered” (Jayo et al., 2011, p. 13).

Meanwhile, Zambaldi et al. (2012) confirmed that the process of financial inclusion in Brazil was determined by the rise of BCs, thus stating that the expansion and profitability of the channel are related to transaction costs, as “transaction costs affect the outcomes regarding scope and scale of financial inclusion initiatives of banks in partnerships with local retailers and entrepreneurs” (p. 3).

These statements were corroborated via a study developed on a random sample, allowing to reinforce the existence of the relationship between the degree of internalization in the channel and the services provided. As a possible cause for this relationship, the authors proposed transaction costs associated to the delivery of additional services through third parties, which was corroborated by the results obtained at the study, proving the association between transaction costs and financial inclusion activities (Zambaldi et al., 2012). Thus:

Implications are clear, but not obvious, because correspondents integration network configurations and service providing depend on legal and contextual aspects that are not exclusively dependent of the decisions of banks and retailers. The results reinforce, however, theoretical arguments that the activities of financial inclusion are driven by transaction costs and therefore face significant limitations in terms of expansion, which should be further addressed. (p. 23)

In this sense, the study on Brazilian case is relevant for several reasons: (a) BCs - until 2011 - have benefited 40 million people in this country, (b) the business model has been positioned as a way to ensure access to financial services for multiple population segments, including the most remote areas of Brazil, and (c) said channel has facilitated the design and delivery of a more comprehensive and inclusive service portfolio.

On both studies, it could be stated that, first, Jayo et al. (2011) failed to define whether such internalization refers to the one for technical and logistic activities, or business process activities. Also, there were no developments on variables such as the monetary amounts managed by the BC, impact of the BC business on the primary activity of the retailers, the banking segments to which the operations performed through the channel belong, the transactional origin of these and the benefits level for customers, especially those belonging to low-income population (Zambaldi et al., 2012).

In this sense, the authors pointed out that BCs controlled and managed by the banks (no delegation) are the most adequate to broaden the range of services in Brazil. However, the contribution of the research is limited by failing to comprehensively address the case of partial delegation, as acknowledged by themselves (Jayo et al., 2011). Thus, there is evidence of an academic gap that hinders the study of the channel in Colombia because, as it will be displayed in following pages: (a) there is a sizable share of partial delegation for BCs, (b) it has been found that BCs can deal with many banks at the same time (multibank BCs), and (c) an increasing number of banks entered the BC business.

The former takes relevance when faced to the statement that studies being developed so far, have remained stuck in the analysis of "...outreach, coverage, number of transactions and amounts of cash involved in the operations that correspondents perform" (Zambaldi et al., 2012, p. 4). Barring the breakthrough of Jayo et al. (2011), who did generate a relevant

contribution by employing a taxonomy in order to analyse the relationship between the different BC types and the service portfolio delivered.

It might be considered that bancarization and its solutions correspond to a reality that is evident in Latin America. For this reason, and despite the need of adjustment to the Colombian realities, the study performed by Jayo et al. (2011) in Brazil is pertinent as a starting point to learn about the operation and initiatives that led to channel development, similar to those in the Colombian case; however, it must be noted that said study did not contemplate agency problems during BC operations.

When it comes to the Colombian case, it is pertinent to analyse the evolution and development of the channel. For this, the implementation of the *Decreto 2233* of July 2006 must be regarded as the legal starting point from which the Colombian government intended to increase the coverage of financial entities to all municipalities in the country, employing the BC channel as a high-impact tool for that purpose. This way, the government achieved the target of increased financial coverage, since 99 % of the municipalities had access to financial services in 2012.

However, it is recognised that the government designed a number of strategies based on incentives and transfers to achieve this outcome since, on the one hand, subsidies on the service supply were offered, that is, banks that developed the BC channel obtained benefits from that. “The BdO decided to study an incentive scheme that allowed the resolution or partial compensation for some of these difficulties, which led to the opening of three calls between 2007 and 2010 to encourage the network expansion” (Marulanda Consultores, 2013, p. 6, translated from the original Spanish).

And on the other hand, transfers of FA subsidies, aimed to the poorest population, were a driver for channel: “The political reality and circumstances behind the expansion of the FA program demanded an accelerated expansion of the network, however” (Marulanda

Consultores, 2013, p. 6, translated from the original Spanish). Despite this was positive for boosting the BC business at first, it can also be seen as a variable that puts its continuity over time in jeopardy: subsidies and transfers should not be the main transactional driver for the channel in the country, as this goes against the natural dynamics of the market.

Also, among the experiences gathered from Colombian banks, it can be found that these do not have a business model based on previously conducted studies. Instead, the way to operate the channel and deploy the service portfolio throughout the country is based on the following strategies: (a) territorial coverage and (b) decongestion of bank branches. From these approaches, banks determine the *modus operandi* according to a set of guidelines validated through sampling methods measured on trial and error, but ultimately lacking rigor and preventing them to learn about the users demanding these services.

As a complement, according to the information gathered from the experience of one of the banking leaders who started with the implementation of the channel since its inception, the need for a business model in Colombia is ratified, especially for rural or high-risk urban areas. This, since it is evident that the call performed by BdO, despite the monetary incentives provided by the Government for the operation, did not allow the business model to be viable and sustainable in rural areas where a financial point of contact was required.

The former occurred as the entity did not count with the coverage required by the Government, and thus mobilising cash to these regions was costly. This is how among the difficulties pointed out in the operation of the channel in Colombia, banks require an effective cash transportation model for remote or high risk areas (Marulanda Consultores, 2013). As stated by Marulanda Consultores (2013), “in the Colombian experience, incentives alone were not enough to stimulate private financial institutions until these managed to stabilise their technological platforms and business model” (p. 32, translated from the original Spanish).

The 2013 Financial Inclusion Report from SFC and BdO (2014) stated the same need of a new business model for BC networks. Although the number of BCs increased in recent years, reaching the 97 % of Colombian territory, 40 % of these did not perform any transaction in 2013. Given this situation, SFC and BdO (2014) concluded that the business models banks employed with BCs needed to be revisited. The current research aims to deliver additional inputs to banks and network integration management enterprises in order to improve the management of their BC networks, by selecting the best BCs and allocating a suitable service portfolio while maximising the number of transactions. Against this background, it is appropriate to observe the evolution of the services delivered through BCs in these two countries.

### **Products of the BC Channel**

When it comes to the products in the channel, it is possible to identify three drivers that allowed BCs to reach a greater extent of success in Brazil. Thus, the first driver was the collection of utility bills:

Although the model's success in Brazil can be attributed to a complex variety of reasons, three of them have been particularly decisive: first, the development of the so-called bill collection networks, during the 1990s, in regions with limited coverage of bank branches. (Jayo et al., 2011, p. 3)

This way, said first driver can be considered to be the service that facilitated the first interrelation between retailers and the expansion of the channel in various regions of the Brazilian territory, even the most remote and isolated ones. In this sense:

As a result of this shortage of bank coverage in the Northeast, by the early 1990s a number of companies began to flourish in the region in agreement with utility companies, specializing in assembling collection networks, that is, networks of retail

establishments where the public could pay their utility (water supply, electricity and telephone) bills. (Jayo and Diniz, 2009, as cited in Jayo et al., 2011, p. 3)

On the other hand, the second driver was “the launching of cash transfer programs by the federal government” (Jayo et al., 2011, pp. 3-4), through which the exchanges through the channel were dynamised, as the BCs represented a less expensive channel than the traditional ones for the delivery of this money. Finally, the third driver was the need to diminish traffic in traditional banking branches. At this point, it is important to note the convenience of understanding this driver as a result of the increased use of financial services, which led in turn to the surge of easily accessible channels to attend all users.

On the other hand, and when it comes to the products offered in Colombia, it is possible to state that the drivers in the country resemble those found in Brazil, as the payment of subsidies and transfers, by the government, also became an incentive for growth. This led to a dependence of the channel on FA transfers. Meanwhile, the second driver was the collection of utility bills, since the BC were used as mainly in these activities. Finally, the third driver was deposit operations for banking accounts.

Therefore, it can be stated that despite the similarities of some of the drivers for the channel between Brazil and Colombia, there are some particularities, such as participation rates and other kinds of product offered through the channel in each case. Therefore, it is required to perform an enquiry in which these differences are taken into account to develop a diagnosis of the Colombian realities. Now, it should be noted that despite there is an identification of the drivers made by the previous authors, a gap exists when it comes to the evolution of said market dynamics for the BC channel in Colombia, as other factors have emerged able to be positioned as channel drivers have emerged.

The first of these is the rise of mobile banking, a channel that requires joint efforts with the BC network for its operation, in turn increasing the flow of transactions and products

through the latter. This relates to the mentions made by Safaricom (2013) regarding the parallel rise of mobile banking and BC networks in Kenya, where BCs were positioned as a necessary means to validate transactions performed via mobile phone in the country.

In a preamble addressed to the *Comisión de Regulación de las Comunicaciones de Colombia* [Regulatory Commission for Communications of Colombia] (CRC), Telefónica Móviles highlighted the need to increase “financial deepening and promotion of BCs” (CRC, 2013, p. 48, translated from the original Spanish) to provide an adequate mobile banking service. This way, it is expected that mobile banking turns into a driver for the BC channel in Colombia, for which the current research takes that factor into account when understanding the status and perspectives of the channel.

Plus, another factor to be considered as a driver is the effort made by governments to promote financial coverage in their territories. As Jayo et al. (2011) identified for the Brazilian case with the Brazilian Federal Government, said motive was relevant to the expansion of the BC channel in Colombia. Finally, according to Asbanc in Peru (2013):

One of the main innovations aimed to bring the banking offer closer to a greater number of users was the introduction of cashier correspondents into the country. Thus, since 2005, the year in which the *Superintendencia de Banca, Seguros y Administradoras Privadas de Fondos de Pensiones* [Superintendence of Banks, Insurance and Private Administrators of Pension Funds] (SBS) issued regulations that allowed their opening, this new attention channel has been gaining an ever increasing importance within the range of possibilities users have to perform financial transactions. (p. 1, translated from the original Spanish)

Therefore, the shared purpose between governments and the financial sector is also set as a driver that has not been considered in the existing literature. The former is expected to be taken as a factor for channel growth in the country under study, throughout the current

research. Finally, another aspect to observe is the width of the services offered by BCs: when the first normativity on the channel was published in Colombia, correspondents were authorised to offer only some kinds of services, namely:

(a) funds collection and transfer; (b) delivery or reception of local wires in Colombian legal tender; (c) cash deposits and withdrawals from current accounts, savings accounts or term deposits, as well as fund transfers involving those accounts; (d) balance enquiries for current or savings accounts; (e) issuance of statements; and (f) disbursements and cash payments related to active credit operations. (Decreto 2233, 2006, p. 1, translated from the original Spanish)

Later on, following the expedition of the *Decreto 2672* of 2012, a wide range of service modalities were added to the offer:

1. “Cash-in or cash-out of resources in Colombian legal tender related to foreign exchange operations to be forcefully channelled through the money market” (Decreto 2672, 2012, p. 5, translated from the original Spanish).
2. “Cash-in or cash-out of resources in Colombian legal tender related to foreign exchange operations not to be forcefully channelled through the money market” (Decreto 2672, 2012, p. 5, translated from the original Spanish).
3. “Cash-in of money for or as a result of operations performed through securities intermediaries” (Decreto 2672, 2012, p. 4, translated from the original Spanish).
4. “Payment of dividends or yields on titles managed by stock brokers, as well as resources obtained from investment sales” (Decreto 2672, 2012, p. 4, translated from the original Spanish).
5. “Delivery and reception of proofs or certificates for securities handled through central securities depositories” (Decreto 2672, 2012, p. 4, translated from the original Spanish).



6. “Cash-in of resources bound to be invested in a mutual investment fund, as well as its devolution” (Decreto 2672, 2012, p. 4, translated from the original Spanish).
7. “Collection, payment and transfer of resources associated to the management of mutual funds” (Decreto 2672, 2012, p. 5, translated from the original Spanish).
8. “Collection and delivery of documentation and information related to mutual funds currently managed” (Decreto 2672, 2012, p. 5, translated from the original Spanish).
9. “Collection and payment of resources associated to the entry to voluntary pension funds” (Decreto 2672, 2012, p. 5, translated from the original Spanish).
10. “Collection and delivery of documentation and information related to the entry to voluntary pension funds” (Decreto 2672, 2012, p. 5, translated from the original Spanish).
11. “Collection and payment of resources associated to authorised operations in trust companies” (Decreto 2672, 2012, p. 5, translated from the original Spanish).
12. “Collection and delivery of documentation and information related to authorised operations in trust companies” (Decreto 2672, 2012, p. 6, translated from the original Spanish).

Against this, it is possible to show an evolution in the service offer for the Colombian case, thus requiring the research to take said change into account, as it complicates the understanding of the channel and the use the different actors give to the latter. So far, the review of literature has provided an overview of the business status and the products and drivers of BCs in Colombia (studied country) and Brazil (worldwide leader on BCs). A study on customer choice criteria was developed next.

### **Customer Choice Criteria in Retail and Retail Banking Selection**

As stated by Muzenda (2014), “...the growing competitiveness in the retail banking industry has made it increasingly important that retail banking institutions need to

consistently review principal factors that influence customers' choice of selection of a retail banking services provider" (p. 198). That same competitiveness is faced by retailers.

Since the current study aimed to improve the performance of the BC channel in Colombia, it was important to identify the factors that lead a customer to choose, on the one hand, one retailer instead of another and, on the other, one bank instead of another. The above given the dual nature of BCs, since these provide retail and banking services at the same location. Due to the fact there are no studies on the factors influencing a customer to select a BC, it is possible to bring some light on the criteria that would bring a customer to choose a particular BC instead of another by making a review of the findings about the customer criteria when selecting a retailer in first place, and a retail bank in second place.

In this regard, Pan and Zinkhan (2006) proceeded to make a literature review of retail patronage explanatory factors, that is, the reasons behind the selection of a store and the frequency of shopping in the same by a particular customer. First, the authors concluded that the factors associated with retail patronage could be ranked as follows: (a) wide selection/assortment of products offered in the store, (b) service quality, (c) good quality of the retailer's merchandise, (d) store atmosphere (store physical attributes), (e) low price of the retailer's merchandise, (f) convenient location, (g) fast checkout, (h) convenient opening hours, (i) friendliness of salespeople, and (j) convenient parking facilities. Also, the authors identified that the factors associated with shopping frequency could be ranked as follows: (a) shopper's attitude toward the store, (b) gender, (c) store image that the shoppers form about the store, (d) age, and (e) income.

In relation to the factors associated with the selection of a retail bank, the literature findings can be summarised in Table 2.

Table 2

*Retail bank selection criteria of customers identified by the literature*

<b>Researcher/s</b>	<b>Research country</b>	<b>Important selection criteria</b>
Laroche, Rosenlatt, and Manning (1986)	Canada	Speed of services, competence, and friendliness of bank staff, convenience of location.
Kennington, Hill, and Rakowska (1996)	Poland	Reputation, price and service.
Zineldin (1996)	Sweden	Friendliness and helpfulness of staff, accuracy in account/transaction management, availability of loans, and provision of services.
Ülengin (1998)	Turkey	Extended loyalty programs, the continuous information flow from the bank, the off-site ATMs, the maximum five-minutes waiting time in the branches, a simple application for all the accounts the bank offers. Delivery channels, customer relations.
Owusu-Frimpong (1999)	Ghana	Low service charges and high interest rates.
Ta and Har (2000)	Singapore	High saving deposit interest rates, convenience, and quality of service.
Almossawi (2001)	Bahrain	Reputation, parking space near the bank, friendliness of bank personnel, availability, and location of ATM.
Colgate and Hedge (2001)	Australia and New Zealand	Service failures, pricing problems, and denied services.
Devlin (2002)	UK	Price and service quality factors, corporate brand, and relationship factors.
Abou Aish, Ennew, and McKechnie (2003)	UK, Egypt	Brand, fees, interest rates, and credit availability.
Che Aniza Binti Che Wel and Mohd (2003)	Malaysia	More personal factors compared to sociological factors.
Lee, and Marlow (2003)	US	Convenience (location of office and/or other features such as payroll deduction and direct deposit), low fees and minimum balance requirements, and range of services offered.
Ismail, Selamat, and Boon (2004)	Malaysia	Fast and efficient services, accuracy of transactions, safety of funds, and high confidence, honesty and trustworthiness.
Tank and Tyler (2005)	UK	Reputation, image, recommendation by friends, and family.
Kaynak and Harcar (2005)	USA	Service, image, and charges.
Blankson, Cheng, and Spears (2007)	USA, Taiwan, Ghana	Convenience, competence, recommendation by peers, and free banking.
Manrai, and Manrai (2007)	US	Personnel related considerations (staff), financial considerations (interest earnings and interest payments), atmospherics of the facility, and convenience (ATM and hours).
Kamakodi and Khan (2008)	India	Safety of funds, secured ATMs, ATMs availability, reputation.
Rehman and Ahmed (2008)	Pakistan	Customer service, convenience, and online banking.

(Continued)

Researcher/s	Research country	Important selection criteria
Blankson, Omar, and Cheng (2009)	Cross country	Convenience, competence, recommendations by parents, and free banking.
Mokhlis (2009)	Malaysia	Secure feeling, ATM service, financial benefits, and service provision.
Mylonakis, Malliaris, and Siomkos (2011)	Greece	Convenience and quality of service.
Aregbeyen (2011)	Nigeria	Safety of funds, and technology based services.
Katircioglu, Fethi, Unlucan, and Dalci (2011)	Northern Cyprus	Availability and convenient location of ATM services, and speed and quality of service.
Maiyaki (2011)	Nigeria	Size of the bank's total asset, and availability of large branch network.
Hedayatnia, and Eshghi (2011)	Iran	Quality of service and availability of new banking methods, innovation in banking services, responsiveness and attitude of staff, and price and cost of banking services.
Katircioglu, Tumer, and Kılınç (2011)	Romania	Number of ATM booths, availability of telephone and internet banking, and the number of branch offices around the country.
Hasan, Subhani, and Osman (2012)	Pakistan	High profit and low service charges, religious motives, and quality of service.
Coetzee, Van Zyl, Tait (2012)	South Africa	Image and reputation, and service quality.
Sayani, and Miniaoui (2013)	United Arab Emirates	Religious preferences.
Polat, Yeşilyaprak, and Kaya (2014)	Turkey	High quality of service, and fast service.
Tehulu, and Wondmagegn (2014)	Ethiopia	Friendly or pleasing manner of staff, ATM service, bank speed, service quality, external bank appearance and internal sitting arrangement, secured feeling, proximity to home or work place, availability of several branches, and long operating hours.
Muzenda (2014)	South Africa	Security, service quality, technology product, location, and affordability.

*Note:* Adapted from *Understanding Islamic bank selection of customers: a field research from Turkish participation banks* by Polat, A., Yeşilyaprak, M., and Kaya, R., 2014.

Following the literature review developed by Polat, Yeşilyaprak, and Kaya (2014), it is possible to state that the main five factors identified are the following: (a) service quality (Coetzee, Van Zyl, and Tait, 2012; Colgate and Hedge, 2001; Devlin, 2002; Hasan, Subhani, and Osman, 2012; Hedayatnia, and Eshghi, 2011; Katircioglu, Fethi, Unlucan, and Dalci, 2011; Kaynak and Harcar, 2005; Muzenda, 2014; Mylonakis, Malliaris, and Siomkos, 2011; Polat et al., 2014; Şafakli, 2007; Ta and Har, 2000; Tehulu and Wondmagegn, 2014), (b)

convenience (Blankson, Cheng, and Spears; 2007; Blankson, Omar, and Cheng, 2009; Laroche, Rosenblatt, and Manning, 1986; Lee and Marlow, 2003; Manrai and Manrai, 2007; Mylonakis et al., 2011; Rehman and Ahmed, 2008; Ta and Har, 2000), (c) security (Aregbeyen, 2011; Ismail, Selamat, and Boon, 2004; Kamakodi and Khan, 2008; Mokhlis, 2009; Muzenda, 2014; Tehulu and Wondmagegn, 2014), (d) speed of services (Ismail et al, 2004; Katircioglu et al., 2011; Laroche et al., 1986; Polat et al., 2014; Tehulu and Wondmagegn, 2014; Ülengin, 1998), and (e) friendliness of staff (Almossawi, 2001; Hedayatnia and Eshghi, 2011; Laroche et al., 1986; Manrai and Manrai, 2007; Tehulu and Wondmagegn, 2014; Zineldin, 1996).

### **Agency Theory and Banking Performance**

When analysing performance, the agency theory has been employed by multiple studies as a starting theoretical point. Berger and Udell (2006) analysed the relationship between capital structure and profit efficiency using a simultaneous-equations model, parting from the concept of agency costs. From these, it was found that the higher the leverage of a firm, better profit efficiency is achieved, as agents are forced to act more in line with the interests of principals, confirming that concept.

Another study in which agency theory constitutes a theoretical pillar, specifically the concept of agency costs, can be found in the one developed by Merrett (2006) when analysing the history of correspondent banking channel networks in Australia. Realising the duration of such arrangements, the author mentioned how correspondent banking kept low agency costs, due to how easily such contracts could be changed and enforced, as well as a need for the agents to protect their reputation. Its relevance comes from serving as an application of agency theory on the analysis of alternative banking channels.

Now, a particularly important work can be found at the research of Hughes and Mester (2008), who reviewed approaches for analysing banking efficiency and performance.

First, said study mentioned the existence of multiple approaches for analysing banking technology and performance, with the most relevant for the current study being the structural approach, based on an optimisation concept and a theoretical model of the banking firm. Recent literature on that approach has seen banks as intermediaries that offer complex financial services and diversify risk, contrasting with the traditional theory of production.

Following on the structural approach, the authors mentioned how it relied on cost minimisation or profit maximisation. Specifically, it is assumed that banks “choose a production plan that minimizes costs given its output mix and input prices or that maximizes profits given the prices of its inputs and outputs. In newer research ... bank managers are modeled as maximizing their utility” (p. 4). Also, the concept of scope economy, which refers to the existence of optimal product combinations to optimise costs or profits, is mentioned. Specifically, the idea of a bank having a scope economy if offering a particular product bundle ends up being less expensive than separating such bundle into multiple companies, given a certain scale for the bank.

In turn, the authors mentioned the limits of such approach. Specifically, those related to the correct specification of the inputs and outputs to be incorporated into the optimisation model. For example, the inclusion of factors believed to be external to the production process might lead to overblown efficiency estimates. A similar situation occurs when ignoring bank heterogeneity, showing as an example the difference between rural and urban banking, and how the selection of variables could act as a bias against one or the other, or how benchmarking processes would end up being affected by a restricted benchmarking group.

Finally, another issue arises parting from agency problems. Due to the existence of such costs, according to Hughes and Mester (2008), “banks with high levels of agency problems between owners and managers might choose utility-maximizing production plans, but these need not be value-maximizing plans if the risk-return trade-offs being made are not

efficient” (p. 4). This comes from the possibility for agents to follow their own non-value-maximising goals.

### **Financial Services and Stochastic Transactions**

While working on the location-allocation problem of banking facilities (bank offices, bank branches and Automated Teller Machine [ATMs]), Min and Melachrinoudis (2001) identified stochastic factors at the domain of financial services for justifying the selection of a chance-constrained goal programming: “The model incorporates some degree of uncertainty and stochasticity stemming from the volatility of location factors such as interest rates, inflation, taxes, wages, utilities, demography, market competition, and loan policy” (p. 400).

About this characterization of a location-allocation problem related with financial services, Tsolas (2010), when conducting an analysis on the performance measurements of bank branches, stated that “...the branches typically have little or no direct control over the transactions for services required by their customers...” (p. 437). Thus, banks will find estimating the transactions for financial services difficult to forecast, justified because of its stochastic character. Zhang and Rushton (2008), who proposed a model to select the location of retail banks, also considered the transactions for financial services as stochastic.

In this regard Dick (2002), who modelled the transactions for commercial bank deposit services in the United States, introduced a stochastic term to the demand equation. Inspired by said work, Nakane, Alencar, and Kanczuk (2006) created a model on the demand for deposit and loan services in Brazil that also included a stochastic term in the equation.

The definition of the transactions for BC services as uncertain is mainly due to the main goals behind the development of the BC channel in Colombia. As shown by SFC and BdO (2014), the main goal of BCs in Colombia was “delivering financial services to country regions with low population densities and difficult access” (p. 63, translated from the original Spanish). A second goal was, in turn, the development of a BC network in the marginalised



neighbourhoods of the country's large cities (Marulanda Consultores, 2013). That means that the population targeted by this initiative mainly comprised low socioeconomic strata. By taking the distinctive features of said population into account, a set of reasons to be exposed next displays the difficulty of estimating the transactions for the financial services offered by BCs, and therefore its random character.

First, regarding the transactions for financial services at BCs, there is a gap in the knowledge of the market regarding the kind of products and their size. Even though it was possible to gain greater knowledge on the subject through the public financing programs for BC opening projects carried out in Colombia since 2007, Marulanda Consultores (2013) concluded that the possibility of estimating the uptake of services offered by BCs is limited:

However, when analysing the total numbers of transactions per institutions it is observed how the network of each bank is used at a greater or lesser extent, which depends on the transaction types enabled, the promotion and marketing performed, in such manner that the banks performing more transactions are not necessarily those with the largest networks (p. 18, translated from the original Spanish).

The former reflects a gap in the existing literature on BCs, sustaining that the performance of a BC network depends exclusively on the transaction types allocated and the marketing and promotion strategies developed by the bank in charge (BdO, 2013). Although these elements are important for the performance of the channel, this research adds new ones that are not considered by the existing literature on BCs. Particularly, and following the conclusions of Ramakrishnan (2010), the capabilities and strategies of retailers.

Second, since Colombia is part of the so-called emerging economies, it was necessary to take into account the importance of the financial sector in these economies when analysing the transactions for financial services (Cole, Sampson, and Zia, 2011). In Colombia, while 51.3 % of the working population belongs to the informal sector, 39 % of the retailers do not



keep accounting and 57 % do not have a formal merchant registry (Bustamante, 2011). That explains the importance of said informal economies, and since the lower socioeconomic strata are those with a greater participation in these, that hinders the prediction of financial services demand as the operations and transactions in said economies are usually performed through informal channels (Cole et al., 2011).

Third, it must be noted that the bancarization levels are low in Colombia. According to estimations of the WB from 2011, 30 % of the Colombian population older than 15 years had an account at a formal financial institution (WB, 2015). By taking the Latin American average of 39% into account, it is safe to state that the Colombian percentage is low (WB, 2015). Regarding lower socioeconomic strata, the WB identified that, in Colombia, only 15% of these had an account at a formal financial institution on 2011, with the Latin American average being 25 % (WB, 2015).

The bancarization levels are important when determining the transactions for financial services delivered by a BC. This is how the expansion projects of BC networks at marginalised neighbourhoods for the main Colombian banks saw necessary to include bancarization strategies such as the presence of sales agents, to make viable the development of said network. Since BCs aim directly to low-income socioeconomic sectors, which in turn show low bancarization levels, the definition of a potential market for the services to be delivered to said sectors grow in difficulty.

A fourth and final factor associated with the difficulty of estimating the transactions for financial services offered by BCs comes from the literature studying cash management in ATMs (Castro, 2009; Darwish, 2013; Simutis, Dilijonas, and Bastina, 2008) that defined cash demand as stochastic due to non-seasonal factors:

The historical cash demand for every ATM varies with time and is often overlaid with non-stationary behaviour of users and with additional factors, such as paydays,

holidays, and seasonal demand in a specific area. Cash drawings are subject to trends and generally follow weekly, monthly and annual cycles. For example, people tend to draw relatively large sums of cash at the beginning of each month. Before Christmas, drawing rates soar, whereas in August, during the summer holidays, rates tend to drop considerably. ATMs that are located in shopping centres, for example, are most heaped on Fridays and Saturdays. (Simutis et al., 2008, p. 417)

As a concluding remark, the four reasons exposed above justify the stochastic transactions assumption: the lack of knowledge on the market aimed by BCs, the importance of the informal sector for Colombian economies, the low bancarization rates shown by those audiences targeted by the services offered by BCs and the existence of non-seasonal factors (payday, holidays, etc.) that explain the volatility on the operation volumes for a given period.

### **BC Network Integration Management Models and Contractual Relationships**

Jayo et al. (2011) identified three types of BC network integration management existing in the BC channel at Brazil. At first there is: “Full delegation ... in which both business process and technical–logistic activities are outsourced to network management companies” (Jayo et al., 2011, p. 2). Second, it is possible to find “Partial delegation: A second class of models is characterised by banks performing themselves the business process activities, while technical and logistic activities are delegated (outsourced) to a third party” (Jayo et al., 2011, p. 9). Finally, authors identified “No delegation: A third class of management includes models that do not involve any kind of outsourcing to network integrators” (Jayo et al., 2011, p. 9).

However, it must be recognised that the work of Jayo et al. (2011) did not develop a detailed characterisation for the partial delegation type, given the lack of empirical evidence in Brazil. This constitutes a limitation from that study, as even though that model was not relevant to understand the logic of BCs in the Brazilian case, given its small market share at

the time of the study; this gap hinders the study of BCs in other contexts such as the Colombian at 2015. As the authors themselves recognised:

A significant limitation of the study, however, is the fact that our data collection process for the quantitative phase of the research (Step 2) included correspondents operating according to only two of the three network integration classes identified at the qualitative phase (Step 1). This led us to run the quantitative analysis considering only two model classes (1 – Full Delegation, and 3 – No Delegation). Thus, the results of this step are still exploratory and useful only as a limited extension of the information employed in the creation of the qualitative taxonomy, and are expected to motivate more complete data collection in future research. (Jayo et al., 2011, p. 13)

The former is also recognised by Zambaldi et al. (2012), who accepted that despite the contribution of Jayo et al. (2011) possessed methodological consistency and stringency, it did not tackle the information related to the partial delegation type.

Although these results are consistent with the transactions costs approach, data used in the study did not include correspondents operating with integration class 2 (partial delegation), not allowing for verification of potential differences in scale and scope of corresponding activities due to the outsourcing of business processes and technical and logistics activities. (Zambaldi et al., 2012, p. 11)

Given the above, it was necessary to close this research gap by performing a study where each of the BC network integration management types was taken into account.

### **Studies on Retailers**

When realising that the study unit of the current research is the retailer, the authors and works poised as a contribution for addressing said study unit are introduced. It must be initially mentioned that Ramakrishnan (2010) performed a classification of small informal retailers in India, based on competitiveness, such variable being understood as the strategies

employed to face the expansion of large chain stores or organised retailers. The relevance of this work can be associated to the population involved in the same, as “...the retail industry in India is the second largest employer after the farming sector. About 40 million people are employed in this sector, of which about half a million are in the organized sector” (Ramakrishnan, 2010, p. 251).

Furthermore, despite the small percentage of formal stores, small informal retailers saw these as a threat to their business. As a response, “...several small shopkeepers in India are operating their businesses successfully even when under attack by the organised retailers. This points towards their use of suitable strategies as also the development of appropriate capabilities” (Ramakrishnan, 2010, p. 251). Thus, it must be highlighted that small retailers count with a flexibility advantage, which allows them to employ market strategies adopted to their customers' needs, one of these is the personalization, which is not found in formal chain store retailers, at least not to the same extent (Ramakrishnan, 2010). It must be noted that Ramakrishnan (2010) profiled small retailers as those featuring (a) small-sized stores under 47 m<sup>2</sup>, (b) usually offering groceries, (c) belonging to the private sector, (d) attended by its owners, (e) with few additional employments and (f) limited product offering.

Therefore, these retailers (informal retailers) developed strategies, identified as: (a) functional strategies, related to variables directly affecting the business operation, some of them affecting technology, price, promotion, product and service; and (b) business strategies, related to the positioning of the business in the market, among which the author identified cost leadership, aiming to achieve lower costs of sale without sacrificing quality and service; product differentiation and focus strategy, based on focusing on a distinct market segment (Ramakrishnan, 2010).

Based on the above, the author managed to decipher how the competitive behaviours of small retailers have a differential impact on results and their attempt to impede the

diffusion and expansion of organised chain retailer stores. In this sense, it must be recognised that despite “...the importance of the analysis of the business strategies of small businesses and states that ‘in particular, little is known empirically about strategy types most frequently associated with profitable small firms’” (Ibrahim, 1993, p. 13 [as cited in Ramakrishnan, 2010, p. 253]). It must also be noted that it is in developing countries where the research identifying the capabilities and strategies of retailers as a tool to stay in the market has been advanced the least. Therefore, the work of Ramakrishnan (2010) positioned itself as a contribution to the research on developing countries, for all latitudes.

Parting from the differentiation on strategies, Ramakrishnan (2010) created a taxonomy, in which the author defined five types of retailers. The first type was characterised by “competitiveness”, which means these retailers are product-oriented and do not pay much attention to the customer experience, the second group was denominated by the author as “middle-of-the-road”, these do not put a major emphasis on the strategies of the retail business; the third type was labelled as “misdirected”, in which the retailers do not focus on permanently observing competitors or improving their facilities or technological tools for customer convenience, as they clearly know about the customers' needs and focus on the products to meet those demands and expand, this way, the influx of shoppers to their stores (Ramakrishnan, 2010).

Meanwhile, the fourth group was labelled as “traditional”, who do not pay attention to investments in technology, since their efforts are focused on the product variety and pricing. Finally, the fifth group is known as “full-service”, such retailers take into account each of the aforementioned variables, i.e., pricing policies, product variety, convenience and customers' needs, technological investment and monitoring of competitors (Ramakrishnan, 2010).

So, the contribution that represents the study of Ramakrishnan (2010) must be recognised, as the classification of retailers, depending on their market strategy, is a

significant factor for the development of the current research, serving as a base for the characterization of BCs in Colombia. Also it must be highlighted that said study was conducted in the environment of a developing country, because of which it constitutes a methodological contribution to understand Latin American retailers, in this case Colombian urban ones: “this study attempts to fill this gap in knowledge as the findings may be representative of the situation in other emerging economies that are witness to a similar evolving retailing context” (Ramakrishnan, 2010, p. 252). Also, the shops analysed were located in urban areas, with that delimitation being applied for the ongoing investigation too.

However, it must be highlighted at this point that Ramakrishnan (2010) did not manage to measure the business performance in an accurate way, given the reticence of managers to give financial information. Because of this, the author compared the relative performance of the store with other local stores. The former can be considered as a gap in the research of Ramakrishnan (2010); therefore, for the current work, it is expected to obtain financial and transactional information of urban retailers in Colombia. In addition, it must be observed that despite the existence of certain similarities between the two countries, India shows key differences such as population, culture and markets, compared to Colombia. In this regard, it is expected to take the aforementioned contributions and adjust them to the realities of the two countries being studied.

Even then, the study developed by Ramakrishnan (2010) allowed to count with a relevant precedent for the design and taxonomical differentiation of retailers in a particular case. “The taxonomic procedure followed in this study was aimed at deciphering differences in competitive strategic behaviour between groups within the small, independent grocery retail industry in India” (Ramakrishnan, 2010, p. 256). This way, the categorisation of the small retailers facilitates to identify the competitive advantages for each of the stores.

Superior performance, which may be considered a result of competitive advantage, appears to be directly related to the ability to integrate all the generic strategies — low cost, differentiation, and focus. This strategic cohesiveness at the top also translates into a well-orchestrated, coherent, mutually reinforcing retail functional-level strategy. Attaining this degree of strategic synergy should be the endeavour of small retail managers in emerging economies like India. (Ramakrishnan, 2010, p. 256)

In a similar vein to the contributions of (Jayo et al., 2011; Zambaldi et al., 2012), a redesign on the categories used for the classification of stores delivered by Ramakrishnan (2010) by using clusters was required, as it enabled to relate the groups of retailers with each of the studied variables (service portfolio, delegation types, banking segments, customers and users) within the context faced by Colombian retailers, as their realities are different to those of India.

In addition to the characterisation of retailers performed by Ramakrishnan (2010), it is worth mentioning the work of Eggers and Kaplan (2013), in which the capabilities of managers or people in charge of offering services are fundamental to understand the results of stores. Capabilities that, according to the authors, are reached or improved depending on the cognitive level of said agents.

...routines and capabilities are based in particular understandings about how things should be done, that the value of these capabilities is subject to interpretation, and that even the presence of capabilities may be useless without managerial interpretations of their match to the environment. (Eggers and Kaplan, 2013, p. 293)

The former is positioned as a contribution and complement to be adopted in the current research, for the execution of the cluster analysis and the characterisation of the channel in Colombia. Hereby, such interpretation proposes that the managerial skills to understand and grasp the processes of their business allow them to improve and develop

greater capabilities in favour of the business; however, said knowledge acquisition is done in three steps, namely: (a) "...the process of 'construction' addresses the ways in which cognition is implicated in the development and maintenance of routines, which are the building blocks of capabilities" (Eggers and Kaplan, 2013, p. 296); (b) "...the process of 'assembly' addresses how these building blocks are assembled based on managerial interpretations of the potential value of the resulting capabilities" (Eggers and Kaplan, 2013, p. 296); and (c) "...the process of 'matching' addresses how choices about the application of capabilities to the environment are shaped by managers' interpretations of the match between them" (Eggers and Kaplan, 2013, p. 296).

Thus, when dealing with those processes and understanding the interrelations between these, it is likely to increase the relation between the managerial capabilities and the results of the business. Associated to the former, Eggers and Kaplan (2013) identified another component of relevance to improve the business activity, mentioning experience at this point; it is through this that new skills and resources are acquired by managers, which positively affects the result of the business.

A central argument of many streams within strategic management is that capabilities and resources are built through experience, and that these capabilities and resources in turn drive organizational performance. The latter is the central contribution of the resource-based view of the firm, which views heterogeneity in organizational resources as an explanatory factor for heterogeneity in performance. (Eggers and Kaplan, 2013, p. 296)

This way, organisations, retailers and stores improve knowledge and execution of the daily business operations, to the extent accumulated experience increases.

To start, experience is often portrayed as the initial input to the development of routines while performance is shown to be the central outcome of interest. However,



this outcome is also a potential contribution to experience, as organizational performance in the current period becomes prior experience that drives capability development in a future period. (Eggers and Kaplan, 2013, p. 318)

In this sense, according to Eggers and Kaplan (2013) the chance to obtain positive results grows as long as the cognitive skills of the managers grow greater. In conclusion:

The presumption is that managers are actively searching for external opportunities, and then engaging in a matching process (driven by the understanding of the firm's routines and capabilities) that assesses the feasibility of building new capabilities to address the perceived opportunities. (Eggers and Kaplan, 2013, p. 321)

Meanwhile, Wu, Hsia, and Heng (2006) explained from innovations how change can turn the organizational capabilities of traditional banks into obsolescence, emulating the creative destruction of Schumpeter (1978). In this context, banks must constantly reconfigure, renovate or acquire the organisational capabilities and required resources to meet the demands of a dynamic environment. The development of basic capabilities may help banks to reallocate their resources and renew their competencies in order to sustain competitive advantage and achieve congruence with the shifting business environment (Wu et al., 2006).

Just like the ability of a company to adopt and exploit an innovation, it is important for banks and BCs to take into account the dynamics of the capabilities required by the sector in the context of BCs. This way, both BCs and electronic banking should deploy their existing technical knowledge on network infrastructure, service offer and transaction security mechanisms, in order to adapt to the new environment and thus reconfigure its capabilities around the needs of the BC channel (Wu et al., 2006).

Therefore, careful coordination with the development of basic skills is required, aiming to respond successfully to technological, commercial and network changes. The capability of a retailer to exploit the services of the BC channel is related - just like electronic

banking - with two generic capabilities: technical and commercial ones. Through a combination of the approach on the core capabilities of electronic banking, Wu et al. (2006) identified the eight basic capabilities required for the success of electronic channels, which are important to for the BC channel as well, namely: (a) the planning of new IT infrastructure; (b) improvements on transaction security; (c) provision of value-added content; (d) delivery of differentiated services; (e) transmission of value propositions; (f) customer relationship management; (g) integration of physical and virtual channels; and (h) positioning of an attractive website (Wu et al., 2006).

With the former as a basis, it was expected to use the variable of managerial skills as an important aspect to achieve the proposed targets, as its relationship with a given BC network integration management model and service portfolio is important to understand the BC business in Colombia.

### **Methodological Studies**

At first, it is necessary to mention chance-constrained programming, which according to Azadi and Saen (2011) is a type of stochastic optimization programming. In particular, chance-constrained programming "... is suitable for solving optimization problems with random variables included in constraints and sometimes in the objective function as well. Stochastic programming deals with optimization problems whose parameters take values from given discrete or continuous probability distributions" (Azadi and Saen, 2011, p. 12232).

On this subject, it is worth mentioning the work from Min and Melachrinoudis (2001), who developed a chance-constrained goal programming (CCGP) model for a bank location-allocation problem. As stated by the authors:

There are two major reasons why we employed a CCGP approach. First, a goal programming (GP) aspect reflects the diverse and conflicting nature of goals (e.g.,

profit maximization versus risk minimization) inherent in bank location-allocation.

Second, a chance-constrained aspect reflects the uncertain and risky nature of parameters and constraints (e.g., bank loan portfolios, bank patronage patterns, service mix, or government regulations) relevant to bank establishment and operations. For these reasons, a CCGP model is suitable for solving a bank location-allocation problem. (Min and Melachrinoudis, 2001, p. 387)

For their work, the authors faced the bank's location-allocation problem when opening a new bank facility (ATM, bank branch or main office) while considering the maximization of the profitability, the maximization of the accessibility, and the minimization of the risk associated. The particular nature of the problem solved by the authors is that each banking facility level could offer a particular set of services, since the higher the place at the hierarchy a facility occupies, the larger the service portfolio. The main office holds the highest hierarchy level in this analysis, with the ATM the bottom and the bank branches in the middle. The authors then concluded that "since the hierarchical link among bank facilities can limit the total budget to be allocated to those facilities and the degree of service coverage, the bank location-allocation should be made in hierarchical sequence" (p. 384).

Although the work of Min and Melachrinoudis (2001) is taken as a reference given their application of a chance-constrained programming model in a location-allocation banking problem, their perspective is not suited to the location-allocation problem faced during this research, and this represents a gap in their research. Specifically, Min and Melachrinoudis (2001) solved a problem exclusively related with banking facilities, in which main perspective was the one from the commercial bank. The problem to be solved in this research holds a dual character as it deals with BCs, who are not traditional banking facilities, but retailers on contractual agreements with banks. On the other hand, and even though the research goal is to deliver a model to banks for the management of BC networks, the

emphasis on this research, that is the key to the solution of the identified location-allocation problem, was not put on commercial banks but on retailers and their capabilities.

In turn, it is important to note the use of taxonomies, as these are positioned to be the first step that “...was designed with the purpose of identifying and mapping all relevant different business network integration models practiced in the channel” (Jayo et al., 2011, p. 5). For that reason, it must be noted that taxonomies have been already employed by Jayo during the development of the first stage of his PhD thesis in 2010; complementing them with a review of the historical evolution of the network managers during the second stage; to finally conduct an inductive analysis, reaching final conclusions and interpretations.

Later, Jayo et al. (2011) made use of that tool again, as they developed the following differentiation based on the choice of three criteria:

The taxonomy development started with our selecting banks with the most relevant correspondent operations. The choice of banks took into account three criteria. First, we considered the size of their correspondent networks, privileging those with the highest numbers of locations. Second, we sought to include banks with different origins of capital (public and private). Finally, responsiveness to institutions to provide information, and availability of executives to be interviewed, were also considered. (Jayo et al., 2011, p. 6)

Also, based on the contribution of the taxonomy created by Jayo et al. (2011) in Brazil, it is intended to create the taxonomy for BCs in Bogotá, Colombia, while each of the three BC network integration management models taking into account. This way, it is intended to close the gap left by these authors by not studying the partial delegation model, given the lack of empirical evidence in the Brazilian case. As previously mentioned, a taxonomy was employed by Ramakrishnan (2010) as well, in which a differentiation was

made between five profiles for informal retailers in India. Said study stands as a contribution to the classification of retailers in developing countries.

Additionally, it is important to mention the theoretical contributions of the second methodological tool to be used, namely the cluster analysis. It was mentioned by Hair, Black, Babin, and Anderson (2010), who defined it as a statistical technique able to classify the information into smaller, mutually exclusive groups, based on predetermined criteria. Parting from the above, it was found that determining the existence of similarities among the members of the sample to be studied was required in order to develop the cluster analysis, followed by the creation of the groups as such, and finally the shaping of profiles and the formation of variables.

Now, Jayo et al. (2011) identified the existing relationship between the BC network integration management models for BCs and the groups of services to be offered through this using a cluster analysis.

The intention of such analysis was to deepen the knowledge on the network integration effectiveness as a financial inclusion instrument and to contribute more decisively to public policies and managerial issues related to financial delivery of services to low income people. (Jayo et al., 2011, p. 6)

The authors applied the following procedure for its execution:

A cluster analysis with use of statistical package Minitab 15 was developed, with data regarding frequencies of different types of transactions performed by correspondents in the sample. The objective was to identify whether clustering correspondents in terms of transaction types and activity levels would be consistent with the taxonomy proposed regarding integration models. (Jayo et al., 2011, p. 17)

Meanwhile, Ramakrishnan (2010) made use of the cluster analysis when studying small informal retailers in India:

The next step in the procedure for generating the taxonomy of strategies was to carry out a non-hierarchical, k-means cluster analysis of the factors derived earlier. The factors were used after developing summated scales based on the items with loadings greater than or equal to 0.50. (p. 254)

On the other hand, even though the cluster analysis technique allowed obtaining a set of differentiated products, it was necessary to analyse these results, in order to obtain conclusions from these as well as being able to obtain a better interpretation of the differences among these groups. One technique employed to that end is the ANOVA, proposed by Fisher (1992) as a technique for analysing the differences on the mean and variance between the groups of a categorical variable, with the latter having two or more possible groups. Said technique has been massively adopted, turning into one of the pillars for statistical inference given its suitability for experimental studies (Hair et al., 2010).

It must be highlighted that the ANOVA test assumes that the dependent variable follows a set of assumptions, the most important being normality. However, the strength of said assumption has been tested in time, to find out whether the results delivered by this technique are reliable when the assumption of normality is violated. Schmider, Ziegler, Danay, Beyer, and Bühner (2010) ran a series of Monte Carlo tests to analyse how robust the ANOVA test remains under violation of normality. It was found that the levels of error type I and II remained constant when a violation was introduced, and that the type of distribution was not significant when analysing test results.

The ANOVA technique, in turn, has seen multiple expansions on its concept throughout the years. One of these is the multivariate analysis of variance (MANOVA) technique, proposed by Wilks (1932, as cited in Hair et al., 2010). It consists of a causality analysis technique that allows measuring the differences between two or more metric dependent variables from a set of non-metric independent variables (Hair et al., 2010).

Another extension of the technique can be found at the two-way ANOVA, which enables the simultaneous analysis of two categorical independent variables with a single metric independent variable, both in their relationship with the latter and the interrelation between the categories of the independent variables.

Likewise, this technique is usually combined with others beyond regression ones. One example can be found at the document of Haldar, et al. (2008), who performed a cluster analysis in order to group and define a categorisation for asthma patients. Said work employed the ANOVA in order to contrast the results obtained in the cluster analysis, regarding the parameters associated to each of the groups.

It must be noted that, for the ANOVA test to be run, the dependent variable must be of the interval or ratio type. Should said variable be categorical, the test cannot be run. An alternative for these situations lies on the Kruskal-Wallis H test, a nonparametric test designed to find the existence of differences between the groups of an independent variable on the values taken by the dependent variable, able to run on ranked dependent variables and when the assumption of normality is violated for an interval, ratio variable (McDonald, 2014).

However, said test has been found to be weaker than the ANOVA overall, even when there are violations in the latter's assumptions (Feir-Walsh and Toothaker, 1974), and thus it is usually dismissed in favour of the ANOVA. Its application is recommended when the dependent variable is not an interval or a ratio, but a categorical, specifically ordinal, variable. An example of its deployment on banking studies comes from the work of Sabi (1996), in which the test was employed for analysing whether foreign banks show greater profitability than domestic ones.

A statement must be made on the nature of statistical procedures such as ANOVA and the Kruskal-Wallis test. It was found that these procedures belong to one of two main categories, parametric and non-parametric. These were defined by Hoskin (2012) as follows:

Parametric statistical procedures rely on assumptions about the shape of the distribution (i.e., assume a normal distribution) in the underlying population and about the form or parameters (i.e., means and standard deviations) of the assumed distribution. Nonparametric statistical procedures rely on no or few assumptions about the shape or parameters of the population distribution from which the sample was drawn. (p. 2).

Following the above, the Kruskal-Wallis test has been classified as non-parametric, while the ANOVA test is considered to be parametric. The latter comes from the assumption that all variables running the ANOVA test follow a normal distribution, while the Kruskal-Wallis test does not make assumptions on data distribution. Even then, as previously stated, ANOVA is usually preferred due to its power even when normality assumptions are violated (Feir-Walsh and Toothaker, 1974).

After this literature revision, it was possible to proceed with the development of the research design and method.



### **Chapter 3: Method**

The following chapter exposes the method proposed in order to test the hypotheses put forward in the current study and, thus, answer the research questions formulated in the same. The following pages deliver an exposure of the research design, followed by the appropriateness of design, population and sample characteristics, finalising with a description of the chosen instruments and the validity of the same.

#### **Research Design**

Since one of the goals for the current research consisted of contributing to scientific knowledge on banking correspondents as a financial inclusion channel employed by banks, it was relevant to understand first what knowledge meant and the implications of contributions to it. This allowed creating a proper research design that built upon scientific knowledge in this particular field.

Given the importance of epistemology in revealing how knowledge is built, it was relevant to clarify which were the tools employed for the construction of such knowledge, as a methodology is required to seize reality through cognitive processes. That methodology consists of elaborating a strategy that enables to evaluate why, how, when, and where data and overall actual facts will be collected and analysed next; implying the selection of a set of determined criteria. Now, following this idea, methods consist of particular techniques and procedures employed to collect and analyse such data (Scotland, 2012).

According to the knowledge construction analysis from this epistemological approach, it was found the current study followed the positivist paradigm, with a deductive focus by applying quantitative tools, in order to build a model that enables increasing financial inclusion through improvements on the management of the banking correspondent channel, through the adequate selection from a universe of feasible retailers, of those that could be opened as BCs under a specific delegation model, in relation to the allocation of a service

portfolio to the BC inside a determined subzone, in order to maximise the channel's performance.

Based on the existing literature and the experience of the researcher at the study of the BC channel, the number of transactions a banking correspondent can perform after being allocated a given portfolio of financial services, according to their own capabilities, was identified as a stochastic factor. In his analysis of the performance measurement of bank branches, Tsolas (2010) stated that “the branches typically have little or no direct control over the demand for services...” (p. 437).

This is how the current study adopted a quantitative character and focused on the resolution of a location-allocation problem, by proposing a model formed by a set of five stages whose specific role at the research design is expanded in the Instrumentation section.

Figure 2 sums up the proposed model.

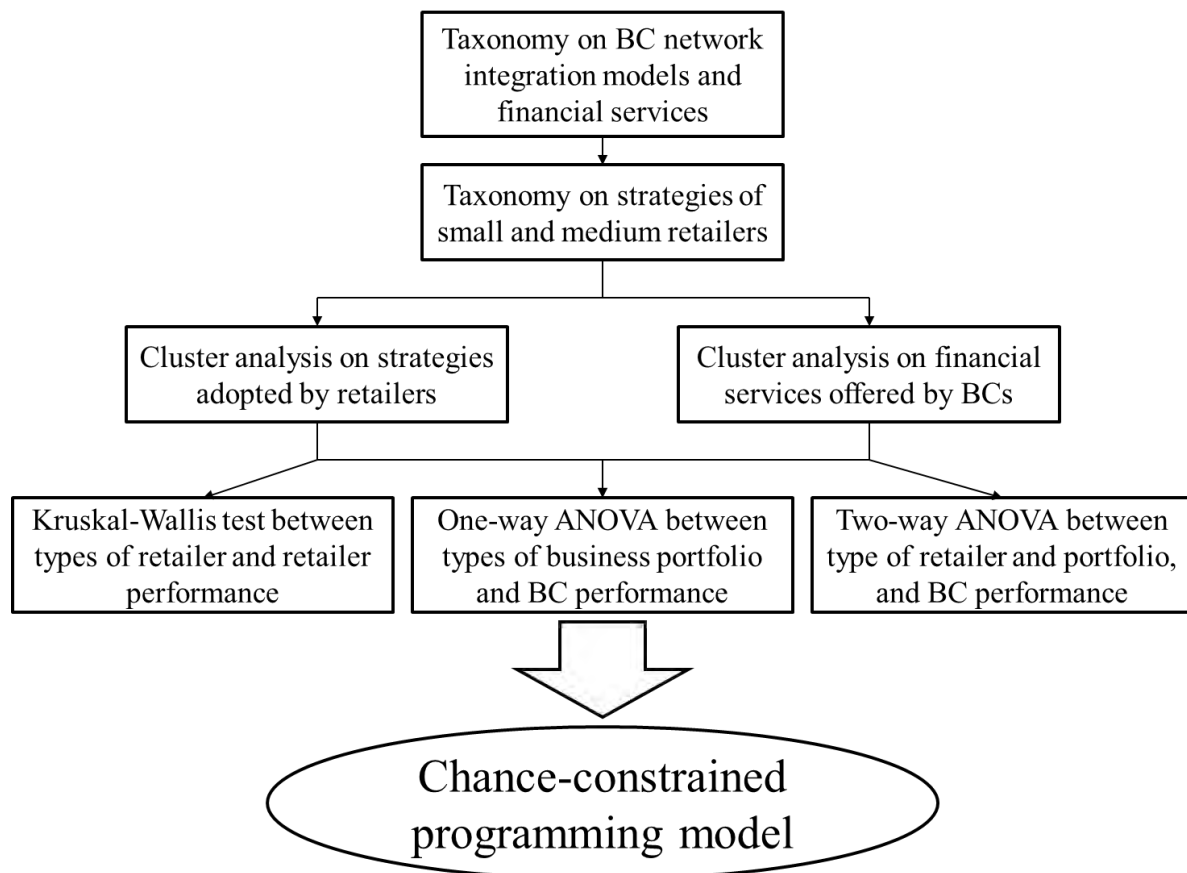
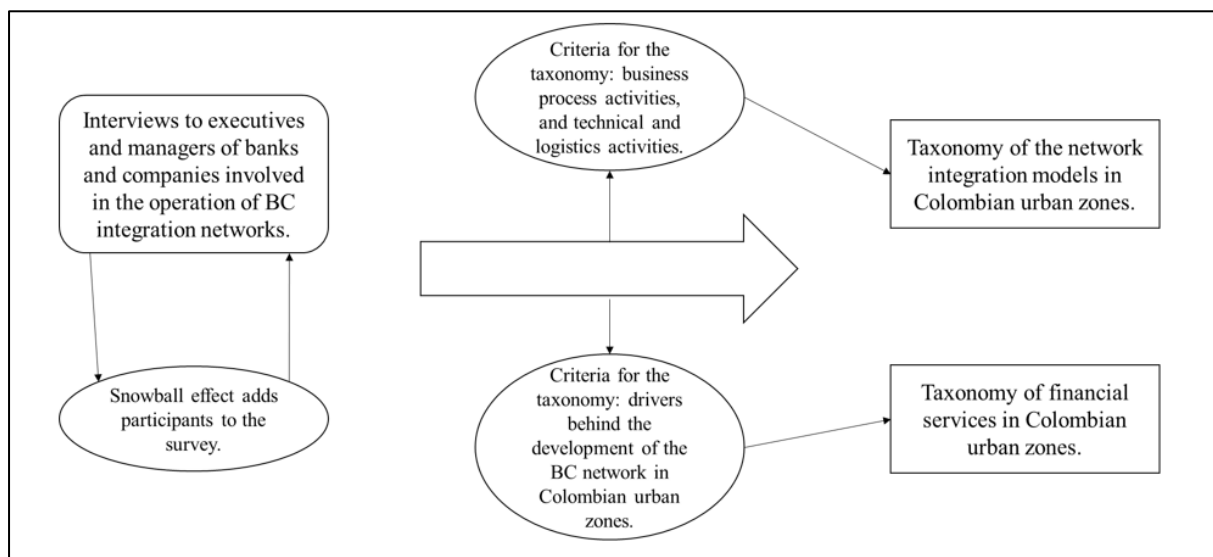


Figure 2 Model proposed to select banking correspondents

The first stage consisted of the development of a taxonomy on the network integration models in order to identify, in one hand, those activities associated with the operational management of BC networks and, on the other, the actors involved in the development of the latter (banks or management companies). The activities were grouped into the two subsets identified by Jayo et al. (2011).

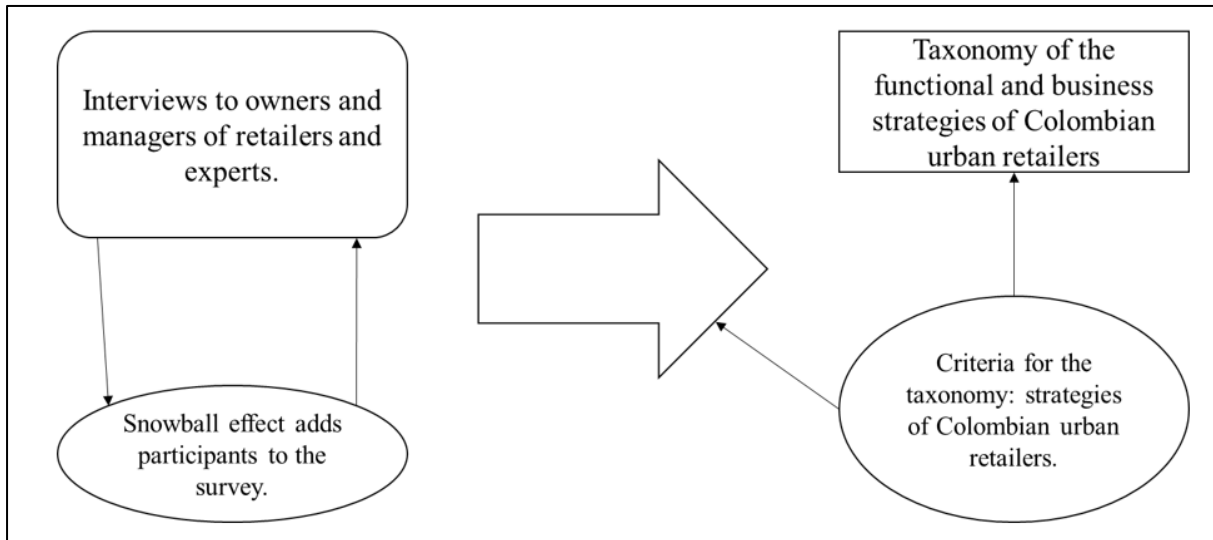
A product of this first step was the development of a taxonomy on financial services in Colombian urban zones; where the methodology employed is similar to that of Jayo et al. (2011), who at first identified the *drivers* associated with the development of the BC channel in Brazil, followed by associating the latter with groups of financial services. Figure 3 summarises the process followed in the development of both taxonomies.



*Figure 3.* Structure of the taxonomy on BC network integration models and financial services. Based on “Groups of services delivered by Brazilian branchless banking and respective network integration models, electronic commerce research and applications” by Jayo, M., Diniz, E. H., Zambaldi, F., and Christopoulos, T. P. (2011). Groups of services delivered by Brazilian branchless banking and respective network integration models. *Electronic Commerce Research and Application*.

The second stage consisted of the development of a taxonomy on small and medium urban retailers in Colombia through the analysis of their functional and business strategies, which allowed learning the capabilities and restrictions of the retail when offering the service. At this stage, the methodology of Ramakrishnan (2010) was partially followed since, an

additional element which was not employed by the Indian researcher, is the implementation of the “snowball” strategy in order to increase the sample of respondents. Figure 4 summarises the process followed in the development of this taxonomy.



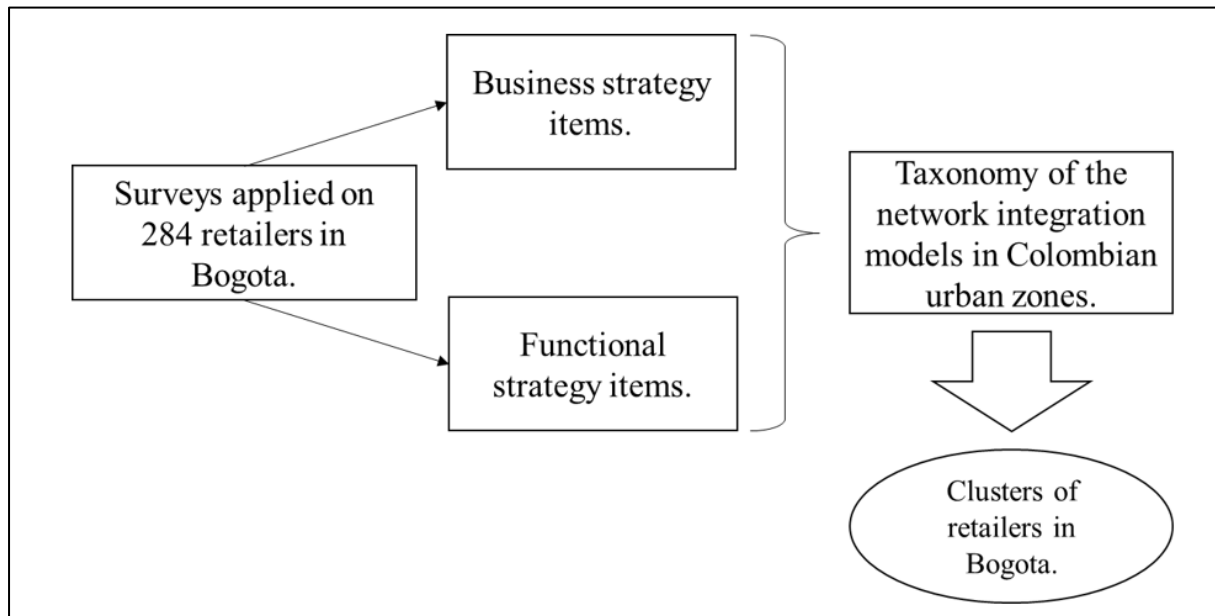
*Figure 4.* Structure of the taxonomy on strategies of small and medium retailers. Based on: “The competitive response of small, independent retailers to organized retail: Study in an emerging economy.” by Ramakrishnan, K. (2010). *Journal of Retailing and Consumer Services*, 17(2010), 251-258.

The third stage took place once the taxonomies were done, being formed by two cluster analyses. Initially, it allowed grouping the retailers feasible to become BCs, according to functional and business strategic factors. It is noteworthy that said cluster took the items identified by Ramakrishnan (2010), but adapting them to the characteristics, traditions and legislation of Colombia, through the results obtained in the taxonomy of strategies, which allowed the classification of small and medium urban retailers in Colombia.

Following Ramakrishnan (2010), the grouping criteria is a set of factors associated to these strategies, obtained from the items associated to the latter through the deployment of a principal component analysis. This way, it was sought to develop a classification of small and medium retailers according to their strategies, organizational and business capabilities. For the Indian case, Ramakrishnan (2010) created a classification based on five different profiles;

however, the differences between the countries and markets led to the creation of different profiles for Colombian urban retailers, that featured different characteristics.

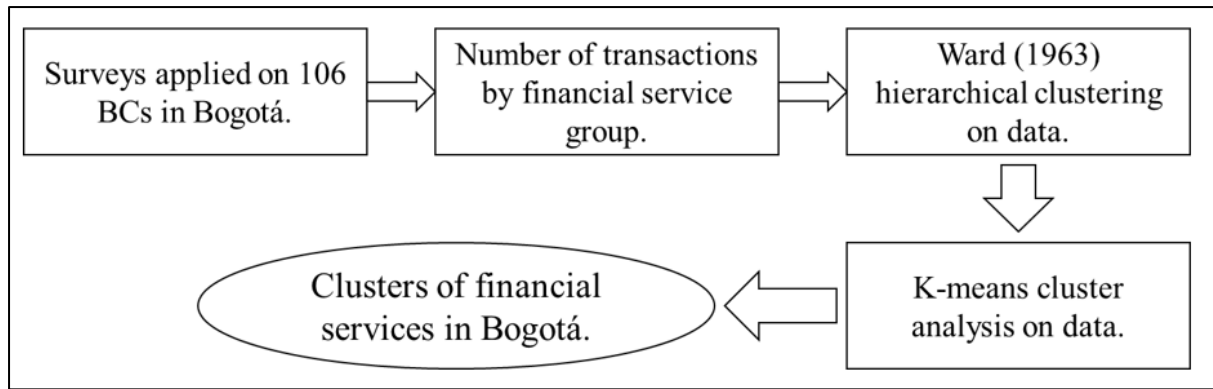
Figure 5 summarises the process followed in the development of the cluster analysis on small and medium retailers' strategies.



*Figure 5.* Structure of the cluster analysis on strategies adopted by retailers. Based on “The competitive response of small, independent retailers to organized retail: Study in an emerging economy.” by Ramakrishnan, K. (2010). *Journal of Retailing and Consumer Services*, 17(2010), 251-258.

The second cluster analysis was developed on the service portfolios offered by BCs, making use of the taxonomies on BC network integration models and financial services. Thus, following the work of Jayo et al. (2011), this cluster analysis aimed to classify BCs according to the numbers of transactions for the multiple financial services offered by each of these (Jayo et al., 2011).

After gathering this information, a Ward hierarchical cluster was carried out in order to determine the number of clusters to be obtained, followed by a k-means cluster in order to obtain a more accurate description for each of these. Figure 6 summarises the process followed in the development of the cluster analysis on services in Bogotá, Colombia.



*Figure 6.* Structure of the cluster analysis on services. Based on “Groups of services delivered by Brazilian branchless banking and respective network integration models, electronic commerce research and applications” by Jayo, M., Diniz, E. H., Zambaldi, F., and Christopoulos, T. P. (2011). Groups of services delivered by Brazilian branchless banking and respective network integration models. *Electronic Commerce Research and Application*

Once the clusters for both retailers and service portfolios had been obtained, the results were validated, seeking to prove that the clusters constitute a differentiator when measuring the performance of BCs, and to test the existence of a relationship between groups of retailers and those of service portfolios observed in BCs. To this end, an ANOVA was run as the fourth stage, as well as a Kruskal-Wallis H test in one case where the dependent variable ended up being categorical.

The performance of a set of ANOVA tables was due to the need of showing the number of transactions performed by banking correspondents, disaggregated by each of the groups obtained in both cluster analyses, in order to compare and analyse the results of these. Similarly, it was required to review whether the categories constitute a differentiator for the number of transaction that retailers conduct as BCs. Finally, it was required to check the existence of a relationship between the obtained clusters. In turn, the Kruskal-Wallis test sought to assess whether the type of retailer constitutes a differentiator for the average daily transaction volumes of retailers for their regular operations. All of these tasks had to be performed in order to ensure these were valid conditions for the chance-constrained programming model.

One Kruskal-Wallis test was run, which took the type of retailer as the independent variable, to be contrasted against the transactions volume of the retailer in order to find differences between retailer categories on the latter. Next, two analyses of variance were performed: one univariate and a two-way one (two-way ANOVA), which have in common that the transactions number for banking correspondent operations were taken as the continuous dependent variable. The first analysis contrasted the type of service portfolio delegated to the BC with the number of transactions associated to BC operations. Finally, a two-way ANOVA was carried on with the number of transactions associated to BC operations as the dependent variable, taking the type of retailer and the type of service portfolio as the independent ones.

Finally, the fifth stage consisted of the execution of a chance-constrained programming model, intended to optimise the performance of the BC channel through improvements in retailer management by banks. This was done through the selection of retailers to turn into BCs under a specific delegation model, allocation of a business portfolio and thus the estimation of the number of transactions said correspondent should be able to perform for each service. It was done by maximising the number of transactions and, therefore, the profits through the channel, while taking into account a set of constraints affecting the retailer such as uncertain transactions, the internal goals of the bank and the types of service it is able to offer at the subzone.

### **Appropriateness of Design**

The research problem to be solved in this investigation belongs to the location-allocation problem family, to be solved by making use of chance-constrained programming. A location-allocation problem usually needs to take one or more of the following decisions (Georgiadis et al., 2011, p. 254):

- Where to locate new facilities (be they production, storage, logistics, etc.).

- Significant changes to existing facilities, e.g. expansion, contraction or closure.
- Sourcing decisions—what suppliers and supply base to use for each facility.
- Allocation decisions—e.g., what products should be produced at each production facility; which markets should be served by which warehouses, etc.

Two of these were taken for the current work. First appears the location of new facilities as one goal of this research, which consists of selecting a retailer to perform as a BC. Plus, the second decision to be taken refers to allocation since another goal of this study is to allocate a particular service portfolio to the retailers selected to become BCs. An additional goal of this study that departs from the usual decision process of location-allocation problems is the selection of a network integration model (delegation type).

According to Taha (2003), linear programming is applied on optimisation models in which the objective and the constraints are linear on the decision variables, that is, the relationships existing within the model are linear (Gass, 2006). Additionally, linear programming implies that for the deterministic problem of mathematical programming, whether it is linear programming, non-linear programming, integer programming, mixed integer linear programming or mixed integer non-linear programming, all data (coefficients) appearing throughout its formulation are known numbers, that is, these do not include any component to represent randomness.

However, the current research considers that on the transactions for financial services at BCs, there is a gap in the knowledge of the market regarding to potential size and the product types. The former turns into an important restriction for some scenarios in which said model could be implemented, given the existence of programming scenarios in which there are no known exact values for the variables to be included in the model, such as in the model to be proposed at the current study.



This is how the transactions for financial services at urban zones of Colombia are defined as uncertain since this is the reality faced by the banks, which means the programming model to be solved would be related with stochastic programming. The situation dealt with on the current research was pointed out by Cerdá and Moreno (2004), as follows:

Stochastic programming deals with mathematic programming problems in which some of the parameters are random variables, either by studying the statistical properties of the random optimal value or other random variables found at the problem or by reformulating the problem into another decision problem in which the combined distribution of random parameters is taken into account. (p.3)

Therefore, it is required to make use of stochastic programming, defined by Prékopa (1995, as cited in Caballero, Cerdá, Muñoz, and Rey, 2004) as “the resolution of mathematical programming problems in which some or all parameters are random variables” (p. 2, 2004, translated from the original Spanish). Said models allow going beyond deterministic parameters at model design, thus giving the possibility to incorporate uncertainty and measurement errors through a chance constraint.

According to the former and for the purposes of the current study, stochasticity came from the transactions performed through the channel, which corresponded to one of the parameters to be considered when formulating the model; therefore, as indicated by Cerda and Moreno (2004), "the objective function does not contain any random variable " (p.5, translated from the original Spanish), which means that the use of chance-constrained programming could be performed to solve this kind of issue.

This is how this type of model, according to Li, Arellano-Garcia, and Wozny (2008), is considered to be a linear problem:

If linear transformation of multivariate distributed variables can be used to estimate the distribution of the constraints. The strategy to solving such a problem is to transform the problem into equivalent deterministic problems. In other words, one can calculate the probability by using the probability density function and substitute the left hand side of the constraint with a deterministic expression. (p. 1247)

Also, taking into account what was pointed out by Li, Arellano-Garcia, and Wozny (2008):

Chance constrained programming is a competitive tool for solving optimization problems under uncertainty. Its main feature is that the resulting decision ensures the probability of complying with constraints, i.e. the confidence level of being feasible. Thus, using chance constrained programming the relationship between the profitability and reliability can be quantified. In other words, the solution of the problem provides comprehensive information on the economical achievement as a function of the desired confidence level of satisfying the process constraints. (p. 26)

Regarding applications of chance-constrained models, Azadi and Saen (2011) stated that said methodology has been deployed in multiple subjects, among which it is possible to find the following: (a) short-term programming on oil refining (Cao, Gu, and Xin, 2009); (b) transmission system expansion planning (Yang and Wen, 2005); (c) vendor selection (Talluri, Narasimhan, and Nair, 2006); (d) waste management systems (Li, Huang, Nie, and Qin, 2007); (e) capital budget issues (Huang, 2007); (f) energetic reactive planning (Yang, Yu, Wen, and Chung, 2007); (g) banking technical efficiency (Chen, 2002); (h) traffic systems (Waller and Ziliaskopoulos, 2006); (i) productive efficiency of inputs and outputs (Land, Lovell, and Thore, 1993). Particularly, Min and Melachrinoudis (2001) applied a chance constrained programming in a bank location-allocation problem.

Therefore, the chance-constrained programming model proposed to optimise channel performance by optimising transactional levels at BCs due to the allocation of a portfolio according to their capabilities, thus enabling a reduction of inefficiencies found at the channel that affect financial inclusion.

Now, when it comes to the preliminary techniques, and given the results found in (Jayo et al., 2011; Zambaldi et al., 2012), a taxonomy was suggested in order to know and identify the variables affecting the channel and also the characteristics of the actors involved on the BC channel in Colombia. It should be noted that the proposed taxonomy is a more complex process than the simple classification, since the level of rigor required is higher. As the classification performed is positioned as a piece of the research process itself, it allows the public interested in the study to gain an easier understanding on the contents of the same (Jayo et al., 2011).

Also, for the development of the cluster analyses during the third stage, it is important to notice that Ramakrishnan (2010) performed a cluster analysis on the business strategies adopted by small retailers was performed. Besides, Jayo et al. (2011) made use of said technique in order to identify the relationship between the delegation types for BCs and the service portfolio. For the development of both studies, it is considered appropriate to use the cluster analysis as a technique given its ability to create categories from existing data (Norusis, 2012). Meanwhile, Anghelache and Armeanu (2008) grouped financial sector entities through the use of the cluster analysis technique, in this case Romanian insurance companies. Likewise, the results allowed to conclude that the cluster analysis ended up being adequate to perform this classification.

Related to the above, Hair et al. (2010) defined cluster analysis an “...analytical technique for developing meaningful subgroups of individuals or objects”. Thus, said

technique allows classifying the data into mutually exclusive subgroups, according to their differences with each other and using predefined criteria.

On the other hand, the ANOVA chosen to validate the results of the cluster analysis during the fourth stage can be defined as a “statistical technique used to determine whether samples from two or more groups come from populations with equal means” (Hair et al., 2010). It was used due to its ability to work with categorical variables, like those associated with the groups obtained from both cluster analyses. Similarly, in order to verify the possibility of developing a chance-constrained programming model, it was necessary to prove the existence of an interdependence relationship between the type of retailer and type of service portfolio allocated to the BC when analysing the performance of the latter. For this purpose, the two-way ANOVA technique ended up being relevant given the categorical nature of these two variables, as well as the possibility of a simultaneous validation.

However, one of the variables related to one of the research questions, “is the type of retailer a relevant differentiator for the transactions volume of these?”, more specifically the transactions volume of the retailer, had been defined as categorical. Therefore, a Kruskal-Wallis H Test was run to answer that question since, even though the test is weaker and harder to understand than a one-way ANOVA, it can be run with an ordinal variable as the dependent one. Its interpretation is similar to the ANOVA, with the null hypothesis stating there is no difference in the means between the groups of the independent variable, without pointing out which groups show different means. Figure 7 sums up when each of these techniques is employed.

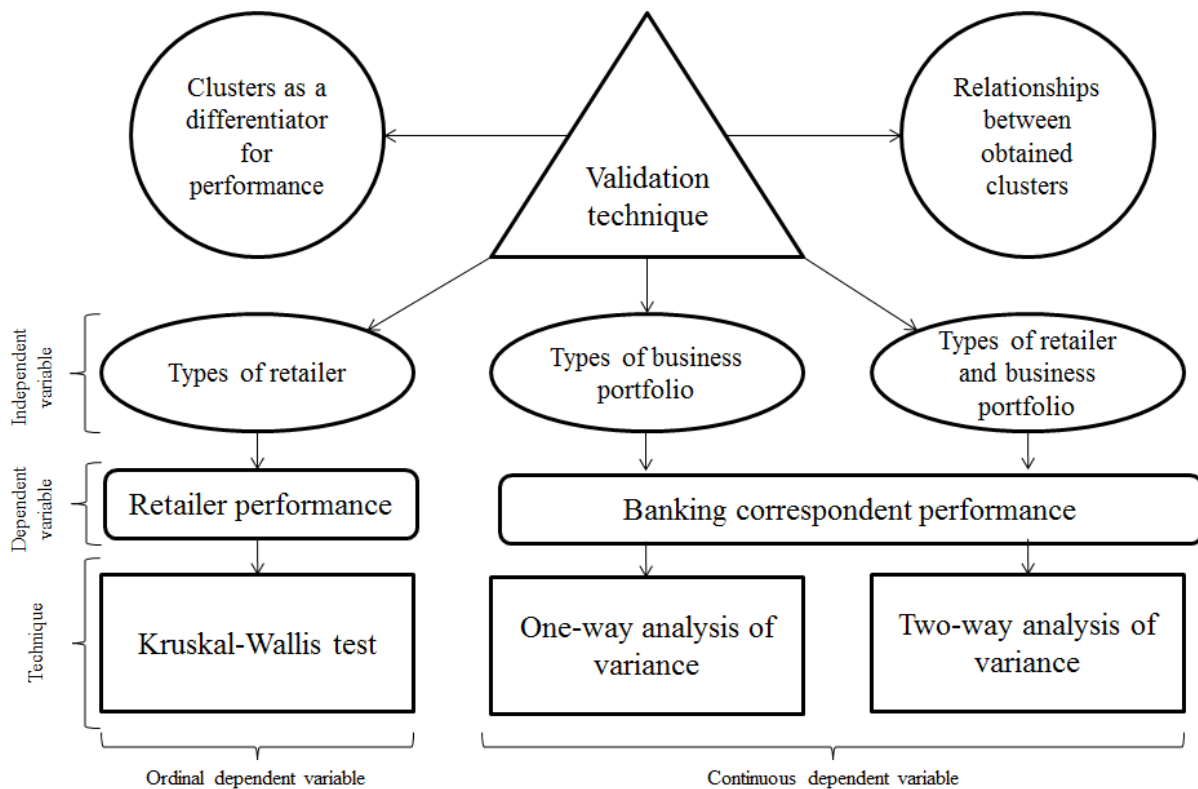


Figure 7 Flow chart for the use of analysis of variance and Kruskal-Wallis test

## Research Questions

The following research questions are proposed:

1. How could a bank select retailers to become banking correspondents and allocate a service portfolio to these given a particular set of restrictions associated with the latter?
2. Which are the main criteria for the analysis by the banks of retailers poised to become banking correspondents in Colombian urban zones?
3. Is the type of retailer a relevant differentiator for the transaction volumes of these?
4. Is the type of service portfolio allocated to banking correspondents a relevant differentiator for the number of transactions performed by these?
5. Are the type of retailer and the type of service portfolio interrelated when analysing the number of transactions of banking correspondents?

## **Population**

The population targeted for this research was formed by the owners or representatives of retail establishments with the potential of becoming BCs, which had to be located in large urban areas, as well as managers and executives of the financial sector entities who are involved in the operation of BC networks in Colombia. The aforementioned choice for the population was based on the theoretical and methodological advances proposed by Jayo et al. (2011) in Brazil and Ramakrishnan (2010) in India.

## **Informed Consent**

The retailers, managers and executives participating in the completion of the survey and interviews received full disclosure on the goals of the current research, in order to ensure their voluntary participation. The only incentive offered to them was gaining greater knowledge on the BC business, which might end up benefiting the implementation processes and their respective market shares.

## **Sampling Frame**

A sample comprising 28 executives and managers of companies involved in the operation of BCs in Colombia was employed during the development of the first and second stages, aiming to obtain relevant and accurate information for the development of the taxonomy, following the example set by Jayo et al. (2011). Also, as a contribution to knowledge, retailers were part of the sample from which the taxonomy was developed, in order to group the most relevant factors for their business and functional strategies. Information associated to Colombia as a whole was gathered throughout these interviews, focusing on urban zones.

For the third stage, a random sample of 284 retailers in Bogotá was employed for the development of the cluster analysis on retailers, following the work of Ramakrishnan (2010). This sample was selected from contacts with trade associations, banks and other

professionals, while delimiting the sample to urban areas, in order to ensure consistency and ease of access to information.

The sample size for this stage was determined through the use of a simple random sampling on a universe of 102,192 retailers able to become BCs in the city of Bogotá (Servinformación, 2014), with a margin of error of 6 %, a confidence level of 94 % and a probability of success of 50 % which, following Hernández et al. (2010), defined the sample of 284 retailers in Bogotá as adequate to analyse the Colombian case.

The choice of the main Colombian city, Bogotá, allowed delimiting the study to the urban areas of the country, since said metropolis reunited all the required urban characteristics as well as all socioeconomic strata, which in turn enabled to analyse the poorest population. This is due to the fact it is Colombia's largest city and the main destination for internal migration, a process that leads to important changes in the population, expansion, densification and socioeconomic profiles of the country as a whole (Vignoli, 2012). Besides, it suits the methodology of Ramakrishnan (2010), as it was created with the Indian urban context in mind.

For the second half of the third stage, the cluster analysis on the service portfolios offered by BCs, a convenience sample was used, following the sampling employed by Jayo et al. (2011) when studying the products offered in the BC channel per delegation model. Due to the ease of access and reliability of the first samples, BCs forming the sample for this cluster analysis were taken straight from the random sample employed for the cluster analysis on retailers, filtering those offering BC services. 106 BCs be selected this way.

It must be mentioned that the companies and retailers selected for the sample belonged to the formal sectors of the Colombian economies, in order to check the information provided by their representatives or functionaries in the future, and also since only formal retailers are able to become banking correspondents in the country. Finally, on the

convenience sample of banking correspondents, it must be mentioned that the financial institution for which these retailers offer banking correspondent services did not constitute a factor during the selection process, as all of these retailers were included with no particular preference for a given financial institution.

Finally, a subzone located at the borough of Suba, in Bogotá, was chosen for the selection of the retailers on which the chance-constrained programming model would be tested. The chosen subzone was the *Unidad de Planeamiento Zonal* [Zonal Planning Unit] of Suba, not to be confused with the name of the borough. As of 2011, it was the third most populated UPZ in Suba, with a total of 145.665 people (SDP, 2011). From this subzone, a total of 27 retailers feasible to become banking correspondents were selected.

This subzone was selected due to a series of factors. First, it is mostly residential, thus giving a high volume of potential banking correspondent customers. Second, it is mainly a middle class zone, with 64.31% of its population belonging to the stratum 3. Also, it shows significant populations at strata 2 and 4. That combination of lower and middle strata turned the subzone into a more desirable location, when comparing with other subzones in Suba, which tend to be more focused on either lower (Tibabuyes, Rincón) or higher (Niza, La Alhambra) socioeconomic strata.

Finally, there are multiple retailers in the zone, due to its relative ease of access. This is reflected on the presence of two malls at the subzone, but also in the existence of multiple smaller retailers that could become banking correspondents. This ensured a certain level of transactionality for potential correspondents, due to the existence of a certain economic dynamism, while keeping true to the fact that most people in Bogotá are classified as stratum three or lower. It must be mentioned that, following the objectives set for the chance-constrained programming model, it was decided that retailers already operating as banking correspondents would be excluded from this sample.



### **Confidentiality**

At the time both surveys and interviews were conducted, there were no requests on personal information of the participants. However, it was important to obtain data related to the characteristics of the retailers and financial institutions represented by them, as well as information on the variables to be analysed.

### **Geographic Location**

The current research was focused on the BC channel in Colombian urban zones, initially on the city of Bogotá, for which both surveys and interviews aimed to obtain information on the operation of the BC model in the country, attempting to offer solutions to failures still occurring in that business. This way, this study sought to be positioned as a contribution to the academy and business sectors, for Colombia and other regional countries.

### **Instrumentation**

As previously stated, BdO (2013) concluded that the current BC business model needed to be revisited. This is mainly due to the fact that 40% of Colombian BCs did not perform any transaction in 2013 (BdO, 2013), putting the long-term sustainability of the channel at risk, as it currently relies on the monetary incentives provided by the Government. Banks need to develop an approach that ensures sustainability promoting the creation of transaction volumes according to their capacities, by offering products for communities.

Considering the above, this research aimed to develop the BC channel by improving its management through the optimisation of the process intended to select a BC and to allocate a service portfolio while maximising numbers of transactions. For this, a chance-constrained programming model, able to solve a location-allocation problem, was proposed. In this regard, Min and Melachrinoudis (2001) pointed out that the location of potential sites for opening a banking facility (ATM, bank branch or main office) must be conducted based on the following selection criteria:

1. Maximization of the market profitability of opened banking facilities.
2. Maximization of the customer drawing power of opened banking facilities.

This is where Min and Melachrinoudis (2001) stated that:

The first criterion is a typical monetary measure in bank location-allocation. This criterion can be met in two ways. One is to minimize total costs associated with the establishment and operation of open banks. Another is to maximize the expected revenues generated from the trading area that open banks are to serve. Therefore, this criterion can measure the profitability of open banks. (p.386)

Following up, the same authors indicated that:

The second criterion is, to some extent, correlated to the first criterion since it affects the market share. Unlike the first criterion, however, it is a probability measure that determines the effects of the customer's spatial behaviour on the accessibility (patronage) of a bank facility. (p.386)

Related to the above, the chance-constrained programming model proposed improvements on BC channel performance through the maximisation on the number of transactions conducted by the retailer, while taking into account the restrictions of retailers, in relation with: (a) the variable  $Y_{jk}$  that referred to the selection between a universe of feasible retailers that could be opened under a specific delegation model, as BCs; (b) the variable  $Z_{jkh}$ , which corresponded to the number of transactions allocated to the retailer opened as a BC inside each specific portfolio. The above goes as shown by the following objective function:

$$\text{Maximise } Z = \sum_{j=1}^J \sum_{K=1}^K \sum_{h=1}^H IN_h Z_{jkh} - \left[ \sum_{j=1}^J \sum_{k=1}^K FC_k Y_{jk} + \sum_{j=1}^J \sum_{k=1}^K \sum_{h=1}^H VC_{hk} Z_{jkh} \right] \quad (1)$$

By looking at the equation, it was expected for channel development to improve due to being correlated with the number of transactions performed at the same, since the total

income is defined as variable according with the number of transactions performed by BCs. In turn, only a part of the cost rises when the number of transactions increases, while the other one (opening costs) would remain the same regardless of the operational scale. It is also assumed that transaction income is higher than the transaction cost when the channel offering services at BCs. That is, the higher the number of transactions is, the higher the profitability of the channel will be.

The values and index range for the indexes  $j$  corresponded with the set of feasible retailers on which the bank shall run the model; the indexes  $k$  and  $h$  were determined from the categories found previously, at the taxonomy on network integration models (that determined the number of delegation models) and the taxonomy on financial services (that determined the number of service types).

Now, according to Taha (2003) the linear programming model shows three main components: (a) alternatives, (b) objective, and (c) constraints to be built from a data set, known as parameters. These constraints indicate under which conditions the solution found is feasible and optimal; because of this, a description for those likely parameters answering both (a) selection and (b) allocation problems was conducted, as well as on the existing relationships between these.

As shown in Figure 8, it was expected for the subgroups formed by the variables integrating the parameters to interact between them. Specifically, the parameters set by the bank must be met by the projections on the BC, that is, a feasible BC must be able to reach a minimum of transactions, for which there must be a maximum of BCs at the subzone in order to avoid these from cannibalising each other's business, as well as market potential given the demands of the people and the transaction volumes reached by the retailer at its core operations.

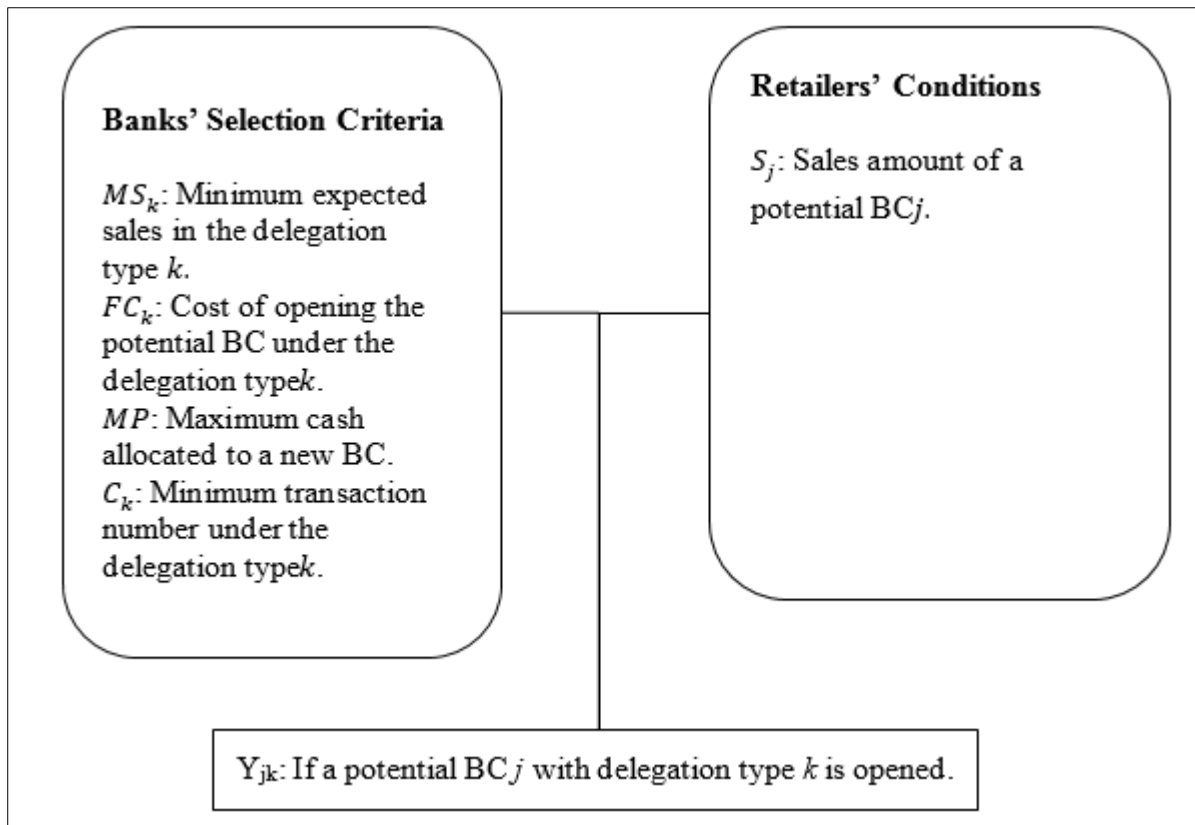


Figure 8. Selection parameters for a retailer feasible to become a BC.

On the other hand, the constraints and parameters associated with the retailer became the main input for the current research, since the mathematical model at the final stage were formulated parting from the understanding of those restrictions. The former since according to Ramakrishnan (2010), these constraints are highly correlated with the type of retailer it belongs to, since stores at a same region have different performance factors associated to these strategies; differences were also found on the retailer's performance according to their socioeconomic strata, their services and their customer's preferences.

Also, it was assumed in the constraints that the number of transactions came in function of these business strategies and the customers' choice criteria; therefore, the competition they could face at the subzone due to the presence of other banking correspondents or banking branches is not taken into account. On the other hand, the transactions for financial services at the subzone could be satisfied by any group of retailers

to be opened as BCs as long as capabilities restrictions are met. These constraints on the number of transactions allocated to a BC are shown in Figure 9.

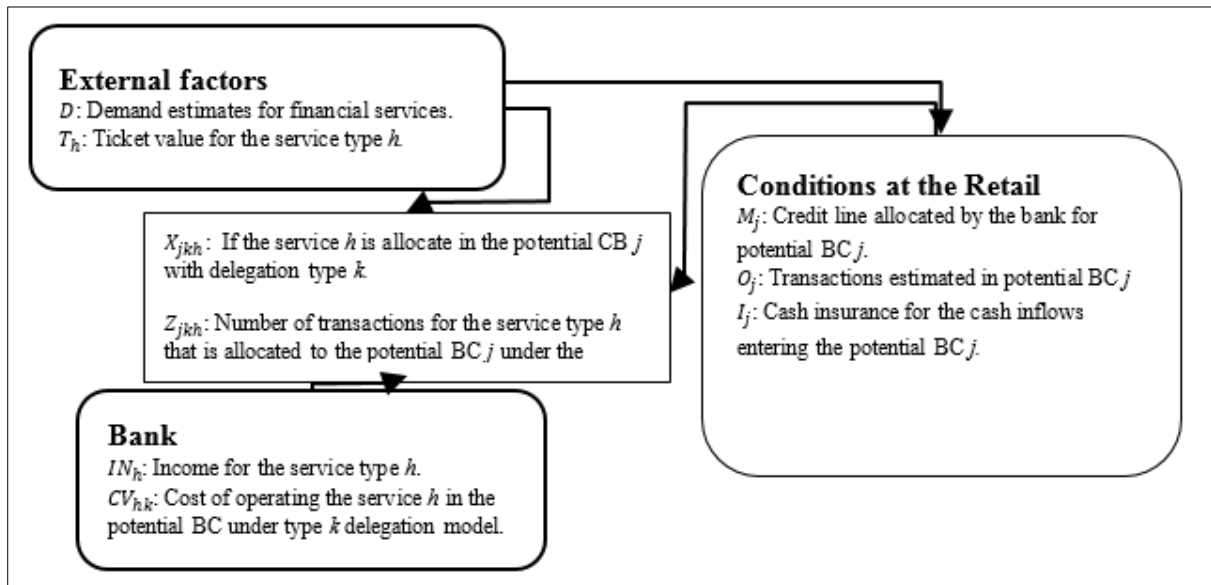


Figure 9. Parameters that determine the number of transactions allocated to a BC.

The stages mentioned during the research design fulfilled a role at the final stage of model construction. Given the above, the variables to be used at each stage were described as well as the role of each stage in the chance-constrained programming model, which allowed creating the aforementioned parameters.

Interviews to executives and managers performed during the taxonomy on BC network integration models and financial services allowed to identify the selection factors of a retailer likely to become a BC such as (a) sales, as well as the restrictions on the number of points a bank is available to open as BCs in a determined subzone, because of which the instrument - an adjusted version of the questionnaire used by Ramakrishnan (2010), adjusted for Colombia - included questions on transaction volumes for each retailer.

Besides, these semi-structured interviews included the operational restrictions in terms of the transactions, as a BC is able to perform as such due to cash from sales and the credit line allocated by the bank, affected by the sales ticket estimated per transaction; likewise, it was possible to identify how banks perform estimations on the transactions at the subzones

where these chose to open the BCs; thus corroborating that these transaction numbers constitute an uncertain factor.

In order to find the number of groups of retailers according to their business and functional strategies at Bogotá, the cluster analysis on retailers had to be conducted. For the above, the items used by Ramakrishnan (2010), as shown in Figure 10, were grouped into factors, parting from the results of the principal component analysis. The former was conducted since small and medium retailers in Colombia showed features comparable to those of India since they are all emerging economies, which allowed replicating the methodology of Ramakrishnan (2010). However, it was needed to adjust the analytical tools of the author to the political, social, cultural and legal realities of Colombia

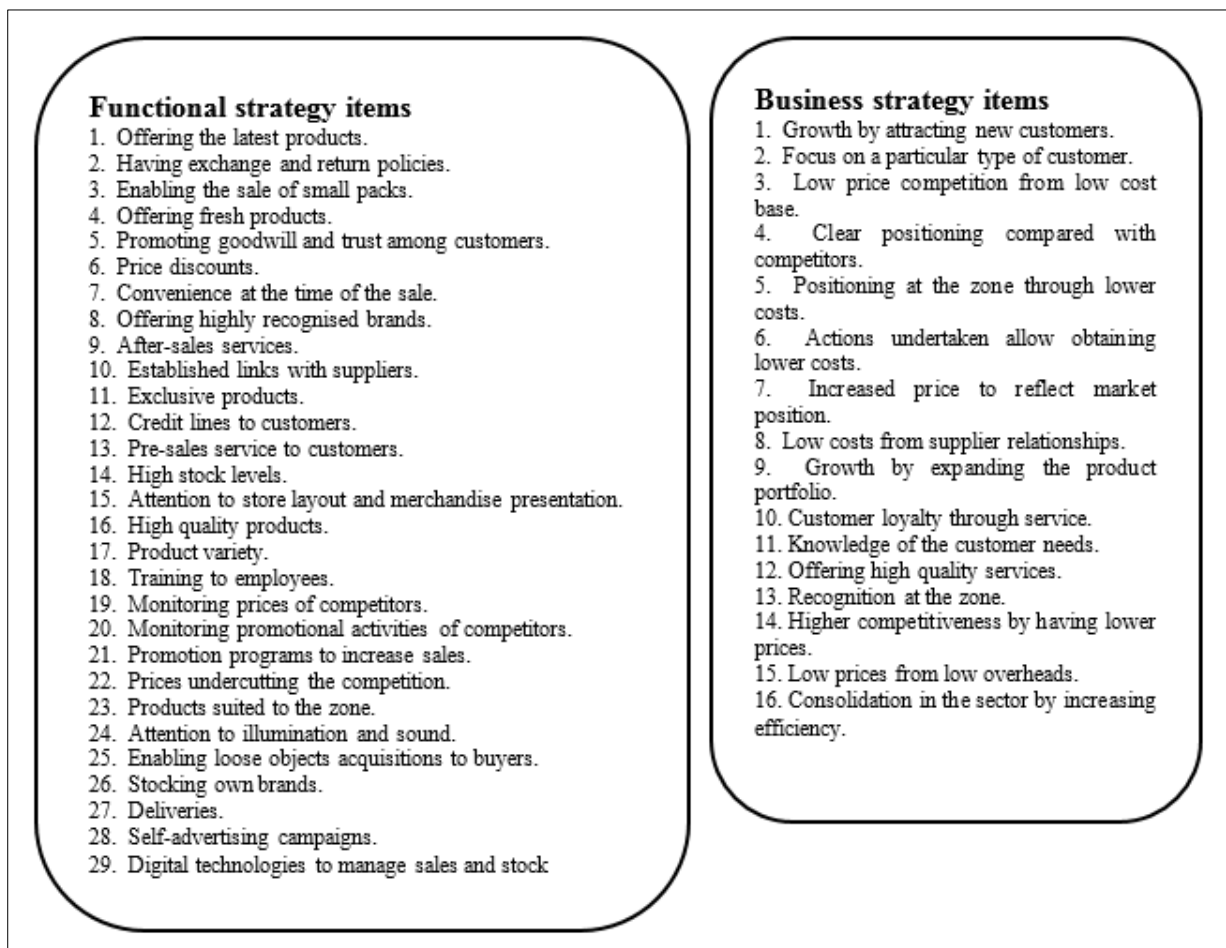


Figure 10. Items for the cluster analysis on retailers. Based on “The competitive response of small, independent retailers to organized retail: Study in an emerging economy.” by Ramakrishnan, K. (2010). *Journal of Retailing and Consumer Services*, 17(2010), 251-258.

It is noteworthy that Likert scales of 1 to 5 were used for the measurement of such items on the surveys. It must be mentioned that these were adjusted through the taxonomy developed from interviews on experts, which were conducted before the cluster analysis. Also, the following variables were measured through the surveys applied to retailers in Bogotá in order to assess the factors behind the selection of a BC by a customer: (a) service quality, (b) convenience (location and opening hours), (c) assortment of products, (d) quality of merchandising, (e) store physical attributes, (f) merchandising price, and (g) security.

Since there is no research about the factors behind the selection of a particular BC by a customer, those variables were selected in accordance with a literature review about the customer's criteria to select a retailer and a retail bank (Abou Aish, Ennew, and McKechnie, 2003; Almosawi, 2001; Aregbeyen, 2011; Blankson et al., 2007; Blankson et al., 2009; Che, Che, and Mohd, 2003; Coetzee, Zyl, and Tait, 2012; Colgate and Hedge, 2001; Devlin, 2002; Hasan et al., 2012; Hedayatnia and Eshghi, 2011; Ismail et al., 2004; Kamakodi and Khan, 2008; Katircioglu et al., 2011; Katircioglu, Tumer, and Kılınç, 2011; Kaynak and Harcar, 2005; Kennington, Hill, and Rakowska, 1996; Laroche et al., 1986; Lee and Marlow, 2003; Maiyaki, 2011; Manrai and Manrai, 2007; Mokhlis, 2009; Muzenda, 2014; Mylonakis et al., 2011; Owusu-Frimpong, 1999; Pan and Zinkhan, 2006; Polat et al., 2014; Rehman and Ahmed, 2008; Şafakli, 2007; Sayani and Miniaoui, 2013; Ta and Har, 2000; Tank and Tyler, 2005; Tehulu and Wondmagegn, 2014; Ülengin, 1998; Zineldin, 1996), and in accordance with Ramakrishnan (2010).

On the other hand, for the development of the cluster analysis of the service portfolios offered by BCs, the variables used by Jayo et al. (2011) and Zambaldi et al. (2012) were taken into account, which were: (a) number of account withdrawals, (b) number of social program withdrawals, (c) number of account deposits, (d) number of invoice payments, (e) number of



utility payments, (f) number of tax payments, (g) number of accounts opened, and (h) total amount of transactions.

However, said scenario was applied on another context, as there are important differences to be noted in these products. Likewise, there are differences between the Brazilian and Colombian contexts, leading to the need to use a specific variable set for Colombia, as well as adjusting transactions to those allowed for BCs in the country.

Given this, the following variables were proposed for the development of both processes in Colombia, in relation to the services authorised in the country (Decreto 2672, 2012): (a) account withdrawals, (b) social program withdrawals, (c) credit disbursement, (d) deposits, (e) financial payments, (f) utility payments, (g) tax payments, (h) tickets for events, (i) account openings, (j) balance enquiries, (k) issuance of banking statements, (l) reception of credit requests, (m) fund transfers, (n) money transfer reception or delivery, and (o) buy and sale of hard currency.

It must be noted that the values collected in these surveys were absolute numbers. These variables were grouped into four categories, namely: financial cash-in transactions, non-financial cash-in transactions, cash-out transactions and information transactions. This classification eased the comparison and analysis of the information obtained for the study. As a side note, this classification seems to apply for the Brazilian case as well, given the services offered by BCs in that country.

Finally, the ANOVA performed between the groups of retailers and those of service portfolios observed in BCs allowed to find the relationship and the restrictions at the retailer regarding transactions and the service portfolio for each group; as well as the differences that might exist between retailer groups when considering the factors behind customer choice and the socioeconomic stratum in which they belonged to. These aspects created a set of constraints that help to explain the asymmetries at the channel between the parties, as well as



the main problem for banks when these have selected retailers to turn into BCs, an aspect that was important when elaborating the chance-constrained programming model.

Making use of what was mentioned in this section, the chance- constrained programming model that solved the main research question followed this formulation:

$$\text{Maximise } Z = \sum_{j=1}^J \sum_{k=1}^K \sum_{h=1}^H IN_h Z_{jkh} - \left[ \sum_{j=1}^J \sum_{k=1}^K FC_k Y_{jk} + \sum_{j=1}^J \sum_{k=1}^K \sum_{h=1}^H VC_{hk} Z_{jkh} \right] \quad (1)$$

*subject to:*

$$S_j \geq MS_k Y_{jk} \quad j = 1, 2, \dots, J, k = 1, 2, \dots, K. \quad (2)$$

$$\sum_{k=1}^K X_{jkh} \leq 1 \quad j = 1, 2, \dots, J, h = 1, 2, \dots, H. \quad (3)$$

$$Z_{jkh} T_h \leq \left( \sum_{h=3}^4 Z_{jkh} T_h \right) \quad j = 1, 2, \dots, J, k = 1, 2, \dots, K, h=2 \quad (4)$$

$$\sum_{h=1}^H Z_{jkh} T_h \leq I_{jk} Y_{jk} \quad j = 1, 2, \dots, J, k = 1, 2, \dots, K. \quad (5)$$

$$\text{Prob} \{O_j \geq \sum_{k=1}^K \sum_{h=1}^H Z_{jkh}\} \geq \alpha \quad j = 1, 2, \dots, J. \quad (6)$$

If the parameters of constraint (6) are uncertain and normally distributed, the equivalent form of the constraint (6) becomes (Taha, 2003; Caballero et al., 2004):

$$\sum_{k=1}^K Z_{jkh} \leq \left( E \{O_j\} + Z\alpha \sqrt{\text{VAR}\{O_j\}} \right) \quad \dots, H.$$

Where  $E(O_j)$  is the expected value of the random parameter  $O_j$ ,  $\text{VAR}(O_j)$  is the variance of the random parameter,  $Z\alpha$  is the Z-score of a standard normal variable for a probability  $\alpha$ .

$$X_{jkh} \leq Y_{jk} \quad j = 1, 2, \dots, J, h = 1, 2, \dots, H. \quad (7)$$

$$Z_{jkh} \geq X_{jkh} \quad (8)$$

$$Z_{jkh} \leq M(X_{jkh}) \quad j = 1, 2, \dots, J$$

$$\sum_{h=1}^H Z_{jkh} \geq C_k Y_{jk} \quad j = 1, 2, \dots, J \quad (10)$$

$$\sum_{j=1}^J \sum_{k=1}^K Z_{jkh} = D \quad h=1 \quad (11)$$

$$Y_{jk}, X_{jkh} \in \{0,1\} \quad j = 1,2, \dots, J, k = 1,2, \dots, K, h = 1,2, \dots, H. \quad (12)$$

$$Z_{jkh} \geq 0 \quad j = 1,2, \dots, J, k = 1,2, \dots, K, h = 1,2, \dots, H. \quad (13)$$

The objective function (1) maximises the utility of the channel through the increase in the number of transactions caused by the selection of BCs and the service type allocation according to the delegation type defined for the retailer, considering the cost of establishing and operating a BC. Constraint (2) indicates that the potential BC will be opened under the delegation type  $k$  if the minimum number of transactions for that delegation type is met. Constraint (3) determines that the service type  $h$  is bound to a unique delegation type  $k$  for each potential BC  $j$ . Constraints (4) and (5) define the cash limitations faced by retailers. Constraint (4) shows that the transaction amounts for the service type  $h = 2$ , which corresponds to financial and nonfinancial cash-out transactions, must not be higher than the cash generated by financial and nonfinancial cash-in transactions. Constraint (5) indicates that the number of transactions at the potential BC  $j$  that originate from the business portfolio cannot exceed cash insurance available to the operation. Constraint (6) shows that the number of transactions reached by the potential BC must not exceed the estimated number of transactions for the service portfolio, where in turn these transactions are stochastic, thus indicating that given a probability  $\alpha$ ; transactions must not exceed the estimated numbers and that there is a probability  $(1 - \alpha)$  for this event to occur.

Constraint (7) makes the feasible solution to be created in association with the delegation models and business portfolios allocated for the potential BC  $j$ . Constraints (8) and (9) ensure that the allocation of a service type  $h$  under each delegation model  $k$ , must be performed on the potential BC  $j$  when said model was selected to turn the retailer into a BC. Constraint (10) states that the total number of transactions at the potential BC  $j$  must comply a minimum, when the potential BC  $j$  is opened under the delegation type  $k$ . Constraint (11)

indicates that the total number of transactions must at least equal demand estimates from the bank. Constraints (12) and (13) provide limits on the decision variables.

### **Data Collection**

Surveys and interviews played an important role in this process, for this reason there was a need to obtain reliable and first-hand information, on the reality of the bank and participating retailers.

For the data collection process performed for the elaboration of the stages, it began with identifying those banks presenting the largest transaction volumes through BCs. This selection was then performed through the use of three criteria: (a) those banks who were associated with large BC networks were taken into account, that is, those possessing a large number of locations and operating with high transaction volumes (the latter definition is not included in Jayo et al. 2011); (b) banks whose capital originated from either public or private sources were incorporated; and finally (c) the responsiveness of institutions for providing the required information and the availability of its executives was considered (Jayo et al., 2011).

Once the banks to be contacted were identified, it was proceeded to develop semistructured interviews on their executives and managers and, through the “snowball” strategy, it was proceeded to expand the sample of respondents in order to identify key participants at BC networks, including executives and directors of network management companies (Jayo et al., 2011).

The semistructured interviews were conducted mostly in person, as these allowed to obtain better response rates, allow to explore attitudes, beliefs and motives of the respondents, ensures all questions are responded, and ensures the quality of the data by controlling false responses or external assistance (Barriball and While, 1994). Finally, and based on the information obtained through the interviews conducted in the previous phase, the information

required for the execution of the first stage, a taxonomy of the network integration models and taxonomy on financial services in Colombia was obtained.

Interviews were used during the second stage as well, whose purpose consisted of adjusting the results found by the author regarding the operational and business strategies for the Indian case, to the Colombian case, as well as adjusting the instrument - questionnaire taken from Ramakrishnan (2010) - that was used on data collection in order to perform the cluster analysis of retailers.

The data employed for the construction of the third stage involving two cluster analyses, was collected through surveys that asked for the transaction volumes and types of services performed by BCs. Said survey was tested through a pilot sample formed by 10 BCs; this as a previous step to the application of the survey on a convenience sample selected from the information obtained on the BC networks, involving both BCs and network managers. In this sense, and following Jayo et al. (2011), the identification of the existing service portfolios for BCs in Bogotá, Colombia, proceeded based on this data collection, using as selection criteria the monthly transaction volumes for each of these services.

It must be pointed out that the Ward hierarchical cluster, the questionnaire to be used and the transactions incorporated in it, were adapted from those used by Jayo et al. (2011) and Zambaldi et al. (2012), while considering the current legal frameworks and authorised services for the BC channel in Colombia. In order to ensure the participation of as many BCs as possible, it was expected to access information able to be provided by executives of major banking institutions.

### **Data Analysis**

For the execution of the chance-constrained programming model, an evaluation was carried among the multiple existing software programs in order to define which one should be used, according to: (a) the number of variables to be employed, (b) the time required to

deliver a solution, and (c) the programming languages managed by the researcher. From this, it was decided that for the fifth stage, the chance-constrained programming model would be written in AMPL, using a cloud-based CPLEX solver for its solution. This tool was chosen due to its availability, simplicity and widespread adoption in academia for linear programming models

Now, in order to analyse the semistructured interviews conducted during the two initial stages corresponding to the taxonomies, a qualitative data software called NVIVO was used, tasked with transcribing the interviews and creating the classification through tags and keywords. These labels were ranked in order to create the basis for the taxonomy design (Jayo et al., 2011). Thereby, this first stage of the research possessed two constitutive moments. The first one was the capture of relevant material or information, aiming to create the labels for classification, with keywords or phrases being proposed in this sense. The second one referred to the hierarchical interpretation given by the respondents to these "quotations". This second phase was largely interpretive (Jayo et al., 2011).

For the development of both cluster analyses and the analyses of variance, corresponding to the third and fourth stage respectively, the data obtained was analysed using the Statistical Package for the Social Sciences (SPSS) software, which processes the information while taking into account the frequency and type of transactions performed by the surveyed BCs, as well as the scores obtained by each observation on each of the strategic factors associated to functional and business strategies.

This program was chosen thanks to its reliability, versatility and ease of use. It is important to mention that, during the third stage both clusters were executed at two different moments, since these have been worked on two different samples: the sample for the cluster analysis on retailers includes retailers that are not BCs yet, while the sample for the cluster on the service portfolio includes existing BCs only.

## Validity and Reliability

In order to assure the quality of the current research, it was necessary to deal with the validity and reliability of the research design (Yin, 2003). When it comes to the validity of the research design, three dimensions are acknowledged by research literature (Creswell, 2009; Yin, 2003): construct validity, internal validity, and external validity.

As stated by Yin (2003) construct validity means to establish “correct operational measures for the concepts being studied” (p. 34). Following Yin (2003), this research will assure the validity of construct by employing the following strategies during the data collection phase: (a) use of evidence coming from various sources; (b) use of a “chain of evidence” (p. 36) by which an external reader could “...trace the steps in either direction (from conclusions back to initial research questions or from questions to conclusions)” (p. 105) by making a correct and exhaustive citation of the database sources; and (c) use of a draft document of the investigation that will be currently reviewed by researching peers, and by participants and informants of the research.

The internal validity refers to “establishing a causal relationship, whereby certain conditions are shown to lead to other conditions, as distinguished from spurious relationships” (Yin, 2003, p. 34). As specified by Yin (2003), the internal validity is only required for explanatory or causal studies where the researcher tries to prove that an event  $x$  is caused by another event  $y$ . Since the current research is an exploratory one that aims to develop a currently non-existent technique for banks to optimise the selection and allocation of BCs, and since no causal relationship is proposed at the model, then the internal validity of the research design was not addressed yet.

The external validity refers to generalising the conclusion obtained from the sample employed to other groups (Creswell, 2009, Yin, 2003). This relates particularly to the question whether results obtained from the surveys developed in Bogotá could be generalised

to cities that present certain similarities with the ones under study in Colombia, and other countries. Since this research holds a quantitative character, the external validity was assured by correct sampling and the use of statistical techniques to generalise the results to a broader universe (Yin, 2003).

Finally, reliability implies that “if a later investigator followed the same procedures as described by an earlier investigator and conducted the same” study then “the later investigator should arrive at the same findings and conclusion” (Yin, 2003, p. 37). The reliability of this research was assured by: (a) the use of a protocol where the all the steps followed at the research will be documented (such as the survey design, execution, and tabulation process); (b) the development of databases to document where the information would be obtained; (c) the use of two marketing consulting and research firms in Colombia to execute both surveys; (d) the use of a research assistant expert in quantitative methods and SPSS for the data analysis; and (e) the use of two external researchers to validate the conclusions obtained at the data analysis.

### **Summary**

In previous chapters, it was identified that current BC business models needed to be modified in Colombia, intending to use proper channel development as a tool to reach the expected financial inclusion level. The former since the channel was developed mainly due to public subsidies, instead of market incentives. The low volume of transactions performed by this channel put its sustainability in jeopardy. This business model had to be revisited as a BC channel needs to be both sustainable, assuring a suitable volume of transactions, and inclusive, bringing it services to all urban hubs.

When banks and network integration enterprises must decide where to locate a new BC, which services it should offered, and how to delegate the network, they must deal with uncertainty and constraints. The uncertainty factor comes from the fact that it is hard for

banks and network managers to estimate the transactions that a BC will face for the services offered. For this reason, transaction numbers were defined as stochastic in the present study. However, banks must deal not only with uncertainty, but also with a set of constraints, in particular the ones coming from retailers' capabilities. A gap in previous studies on BCs came from the fact that they did not include these restrictions, neglecting the fact that the performance of a retailer is tied to its capabilities as was concluded by Ramakrishnan (2010). And since the basic unit of a BC network is the retailer, this study stresses the importance of retailer's capabilities when proposing a model to manage the channel.

As seen throughout the third chapter, the proposed method sought to improve the relationship created by the agency contract between the bank and the BCs, through the creation of a five-stage method which, parting from knowledge on the conditions and constraints of the channel and its parties, was intended to constitute the most optimal way to define the commercial relationships between the parties. This would be achieved by indicating which of these retailers could be opened as BCs and which commercial figure would be best for these, which would be the business portfolio these BCs would be capable of offering, in turn estimating how many transactions could be performed; all of the above given the conditions of the retail and the channel.

Thus, the first and second of these stages were based on the completion of three taxonomies, through which the characteristics of the different BC network integration models in Colombian urban zones, the groups of financial services (Jayo et al., 2011), and the business and functional strategies deployed by small and medium retailers (Ramakrishnan, 2010) were identified.

After that, a cluster analysis was performed, aimed towards the obtention of the profiles of small and medium urban retailers in Colombia, following Ramakrishnan (2010). This was followed by the implementation of another cluster analysis that defined the



characterisation of the business portfolio per BC network integration model. Therefore, the use of this methodological process derived from the need of grouping and relating the BC network integration models obtained in the taxonomy, with the services offered at BCs. This was done by taking the work done by Jayo et al. (2011) as a starting point.

The fourth stage saw the execution of an ANOVA, which allowed to analyse the relationships between the clusters of retailers and those of the service portfolios to be allocated should these retailers turn BCs. In turn, it was studied whether both produce a combined effect on the performance of the latter, defined as the transaction volumes managed by the correspondents per month.

Finally, the fifth stage consisted of the execution of a chance-constrained programming model that made use of the previous stages as an input for modelling channel conditions, as well as constraints at banks and retailers, seeking to contribute to financial inclusion through improvements on BC channel performance. Such improvements would be obtained through the optimisation in the selection of retailers to turn into BCs under a specific delegation model, the allocation of a business portfolio and the estimation of the number of transactions said correspondent should be able to perform for each service. It was done by maximising transaction numbers and channel profits, while taking into account a set of constraints affecting the retailer such as uncertain transactions, the internal goals of the bank and the types of service it is able to offer at the subzone.

## **Chapter 4: Results and discussion**

In this chapter, the results for the current research are exposed. Thus, a description of the data collection process, as well as a data summary, is put forward next. The results for each of the stages of the model are shown next, accompanied by the use of these results in order to accept or reject the hypotheses associated to each research question. Finally, the final iteration of the chance-constrained programming model is displayed. After this, the research proposal deals with conclusions and recommendations in chapter 5.

### **Description of the Sample**

On the taxonomy, a sample of personnel involved at the operations of the channel was selected, in order to conduct a series of semistructured interviews using Nvivo, aimed towards obtaining a greater understanding of the channel as a whole. After conducting a selection process, people from the following participating entities were chosen:

- Banco de Bogotá.
- Bancolombia.
- Carvajal.
- Banco Agrario.
- Banco AV Villas.
- VIA Baloto.
- Banca de las Oportunidades.
- Banco Colpatria.
- Superintendencia Financiera de Colombia.

For the development of both cluster analyses, a sample of retailers in Bogotá was required, as well as a sample of banking correspondents, in order to capture the required information for the development of the current research. Therefore, a data collection process was carried out throughout the city, by hiring an external pollster to apply both surveys.

From the above, the final sample comprised 282 retailers, from which 106 also operated as banking correspondents. It might be stated there was an overrepresentation of banking correspondents at the sample, which is caused by a peculiarity of the request made to the pollster: it was required to interview both random retailers and banking correspondents, which meant there were two samples employed for the research proposal: a sample of 172 randomly selected retailers that were not banking correspondents, and another sample of 110 retailers operating as banking correspondents.

Both samples were analysed to prevent duplicates and non-existing retailers, while incomplete information led to discarding banking correspondent information for some retailers with complete information to conduct the cluster analysis on retailer. This led to the aforementioned total sample size.

After the final sample was defined and tabulated in Excel, a set of descriptive statistics was obtained for the retailers as a whole, namely: (a) the borough where the retailer is located, (b) the main activity of the retailer, (c) the number of years in operation, (d) area, and (e) daily transaction volumes. These descriptive were put in Tables A1 to A5, listed in the appendices.

As it comes, the boroughs with the most retailers in the sample are Engativá, Suba, San Cristóbal and Barrios Unidos, comprising 63.5% of respondents. These boroughs hold 34.2% of the total population in the city. On the other hand, the most frequent type of retailer was mom-and-pop stores, representing 24.1% of the sample, followed by beauty/hair salons and drugstores, with 7.1% each.

Also, it must be noted that more than half of the sample is formed by retailers with less than 5 years in existence, showing the prevalence of relatively young establishments. In turn, above half of the retailers obtained less than 500.000 Colombian pesos in daily transaction volumes, and also areas less than 50 square metres for their locations. Both

indicators state the small-scale nature of most retailers in the country, as well as its youth and its relative inexperience on management and operations.

When it comes to the subset of retailers that also operate as banking correspondents, a different set of descriptive statistics was selected. For these, the descriptive statistics chosen were the year in which the retailers began operating as banking correspondents, the borough where the banking correspondents are located, distance from a banking branch, distance from another banking correspondent, and the reasons behind their decision to become banking correspondents. These descriptive statistics are summarised at the Tables A6 to A10, in the appendices.

On these, a set of trends could be noticed. First, most banking correspondents in the sample were opened during the last six years. This would correspond with an overall surge in the number of banking correspondents throughout the country, due to government assistance and aggressive expansion by banks and network managers. Also, it must be noted that the main reason retailers gave for becoming banking correspondents was the search of additional income, followed by an interest in increasing traffic to their retails, thus increasing the number of potential customers.

On the walking distance from a banking branch, most participants were less than 15 minutes away from a banking branch. This means there is a clustering around well-served areas, hinting towards a potential role of banking correspondents as complements to banking branches, rather than substitutes. It must also be noted, there is no clear pattern on the distance between branches. The former could be explained by potential overlapping between competing network managers.

When it comes to the main activity of the banking correspondent, it must be reminded that banking correspondents are retailers developing banking services as a parallel activity to their main products. That being said, the most common activity was mom-and-pop shops,

followed by call shops, Internet cafés and drugstores. Finally, following the overall sampling, most of the banking correspondents in the sample were located at the borough of Engativá, followed by those in Barrios Unidos.

From the sample, it could be concluded that urban banking correspondents are located near banking branches, thus hinting that these are viewed as complements, rather than substitutes, for branches, by offering complementary and low-ticket products. In turn, most retailers seemed to operate at a small scale, as seen in their areas and their daily transaction volumes. The former matches the idea of banking correspondents as an additional business activity for small and medium retailers, aimed towards capillarity. With that said, the results for the taxonomy shall be put forward next.

### **Taxonomy Results**

From the interviews, a set of labels were obtained. These include the most common items mentioned by the interviewees during the development of the same. The research question associated to this stage is the second question, *which are the main criteria for the analysis by the banks of retailers poised to become banking correspondents in Colombian urban zones?*, and the taxonomy helped to develop the propositions associated to it.

One of the revealing items for the taxonomy came from a mention on “cash management”, which became the first label. Said label includes, on the one hand, the cash requirements for the operation of the channel. Usually, banks and network managers require retailers to conduct banking correspondent operations using their own cash. The retailers are usually given a cash limit for their banking correspondent operations, depending on their operations volume, usually using an ad-hoc ratio or criteria without a sustentation.

Another facet associated to cash management comes from transportation and logistics. Cash is more difficult to manage in remote locations, due to the distance, communications, bad roads and higher costs, and often these tasks are allocated to the retailer itself, thus

increasing their risk. These costs, coupled with the lack of enough transactions to justify them, led to one of the respondents to propose the creation of a model for cash delivery to these remote locations. While this subject was not dealt with at the current work, it highlights the importance of cash in the channel operations. Understanding the cash flows from these operations is crucial.

Given the above, and coupled with professional experience, it could be stated that in order to create the chance-constrained programming model, it is necessary to understand the cash flows involved at the channel operation. By looking at the categories at Banca de las Oportunidades (2015a), a classification to the transactions according to cash flows was reached:

- Financial cash-in operations: these operations involve cash entering the BC, coming from banking-related operations. These include cash deposits, and financial obligation payments.
- Non-financial cash-in operations: on these operations, non-financial operations are conducted, that constitute a cash entry for the correspondent. In this category, it is possible to find utility payments, third-party collections and money transfer cash-in.
- Cash-out operations: these are operations that imply a cash outflow from the banking correspondent, affecting their availability. In this category, no distinction was made between financial and non-financial operations. The category includes cash withdrawals and money transfer cash-out.
- Information operations: these operations do not involve any cash flow from and to the BC at all. Among this it is possible to find electronic fund transfers, account openings and credit request acceptance.

Another label that could be found from the interviews was “number of transactions”.

According to BdO (2013) up to 40% of the banking correspondent devices did not perform

transactions during 2013, thus implying an inadequate service portfolio or a lack of interest by consumers on the services offered by the channel. Also, there were different policies regarding minimum requirements to potential BCs, based on some of the responses. Some agents prefer to set individual minimum requirements for potential BCs, while others prefer to set collective minimum requirements per BC, allowing the entrance of BCs that are not expected to fulfil the minimum individual requirements by measuring them together with those BCs expected to do so.

There is another label created to include more general aspects of the business, which was denominated “strategic goals”. These can be found on two fronts: the intentions behind the current expansion of the BC network, and the way to approach retailers. On the first category, it was noted how two of the main drivers identified for the Brazilian case by Jayo et al. (2011) apply in Colombia as well: bringing coverage to remote locations, and decongesting banking branches. These goals were found among the responses. On the other hand, it must be highlighted one of the respondents mentioned a different way to approach retailers. Namely, by putting their profitability first, they intend to obtain the best potential retailers for their business by paying more per transaction, and absorbing some costs that are usually paid by the correspondents.

Finally, there were important differences on the “delegation levels” for the channel. One of the respondents mentioned the existence of multiple models, roughly following the classification of Jayo et al. (2011). That is, they mentioned there were no delegation, partial delegation and full delegation models. On the parties involved at the operations, the use of both external collection networks and specialised banking correspondent networks was mentioned, as part of a set of different strategies. Also, it was mentioned how minimum transaction requirements from either of the parties vary between delegation models.

From the above, it could be stated that Colombian banking correspondents are defined by the transactions from the public, strategic goals from the banks, the participation of multiple third-parties at the operations, and the importance of cash management for both retailers and banking correspondents. However, no mention was made of defined criteria for selecting and identifying potential BCs, beyond making use of existing networks and deciding on an individual basis. The capabilities of the retailer beyond monetary ones seemed to be ignored, thus leading to potential misallocations. Same thing applies for the demand from potential customers, which was barely mentioned but not detailed.

Because of this, it could be stated that the channel, even though it has been able to amplify its coverage, still lacked on transactionality and better selection criteria, pending a proper identification for the retailers and their features, as well as the needs of the consumers and the relationship between the capabilities of these retailers and transaction volumes. The results for the next stage, both cluster analyses on retailers and portfolios, shall be described below.

### **Results on the Cluster Analysis on Retailers**

As defined in chapter 3, two cluster analyses were performed: one cluster analysis on the retailers according to their capabilities and the importance of a set of features, and another one on the business portfolio offered by banking correspondents. In the case of the cluster analysis on retailers, it was performed according to the scores given to the importance of a set of items, following Ramakrishnan (2010). It must be highlighted that a Cronbach's alpha test was run on these items, in order to verify internal consistency. A value of 0.824 was obtained, thus meaning the instrument enjoyed adequate reliability.

These items were grouped into factors, using a principal-component analysis, in which items with low correlations and commonalities, as well as items with loadings above 0.4 for



more than one factor, were eliminated. Thus, the Tables 3 and 4 show the factors that were obtained:

Table 3

*Functional strategy factors*

Functional factors	1	2	3
Latest products at the market	.796		
Fresh products	.795		
Adequate products for the zone	.780		
Price discounts		.754	
Exclusive products		.747	
After-sales service		.740	
Deliveries			.787
Own promotion campaigns			.679
Convenience during the sale			-.632

Table 4

*Business strategy factors*

Business factors	1	2	3
Actions allow to obtain low costs	.843		
Low cost through relationship with suppliers	.741		
Higher prices to reflect positioning	.736		
Positioning through cost cutting	.693		
Recognition at the zone		.741	
More competitive through low prices		.718	
Focused on a specific type of consumer		.712	
Consolidation and efficiency through efficiency increases			.766
Customer loyalty through good attention			.763
Clear positioning compared to competitors			.618

It must be noticed that only three factors remained on both strategy types. For functional strategies, factor 1 (product quality and variety) grouped items related to the products offered by the retailers, while factor 2 (service and customer loyalty) related to daily activities focused on retention and customer satisfaction; finally, factor 3 (convenience during

the sale) related to the sale process itself. When it comes to business factors, the items were grouped into three categories: a factor related to cost management (factor 1), another factor associated to differentiation strategies (factor 2), and the last one incorporating competitive strategy (factor 3).

From this, it could be stated that retailers tended to value price controls, customer convenience and differentiation as valuable topics for their daily operations, in turn allowing these factors to become differentiators between multiple types of retailers. On business factors, retailers gave importance to cost control, recognition and customer service. Thus, it could be stated that these factors were the most relevant for retailers when designing their plans around which their operations shall take place in the future, as well as on the design of an overall business strategy.

Using these factors, a cluster analysis on the types of retailer was conducted. The results for said cluster shall be put in Table 5:

Table 5

*Results for the cluster analysis on retailers*

	Type of retailer		
	Integral	Traditional	Specialized
Product quality and variety	4.47	4.16	2.91
Service and customer loyalty	3.72	2.36	3.47
Convenience during the sale	2.85	2.31	2.38
Cost management	3.97	2.57	3.43
Differentiation strategies	3.21	3.54	4.28
Competitive strategy	3.96	3.78	3.79
Mean	3.70	3.12	3.38

Three types of retailer were identified: an integral retailer, which scored highest on most of the analysed factors, with specially high results for “cost management” and “product quality and variety”, a traditional type, with rather low scores on most factors besides

“product quality and variety” and “competitive strategy”, and a specialised type of retailer, with a great emphasis on “differentiation strategies” according to their scores, but a rather low score for “product quality and variety”.

The names for these types of retailer were chosen after these scores, which closely followed a set of patterns observed in Colombian retailers. Thus, “traditional” retailers only seemed to care about product and positioning, while ignoring differentiation and an overall professional management. Those labelled as “integral”, on the other hand, observed consistently high results throughout the different categories, pointing towards a comprehensive management and consideration of all strategic factors when running the business. Finally, on “specialised” retailers, these seem to emphasise on differentiation strategies while putting less attention on product variety and quality. This description is consistent with that of a retailer aiming to a very specific niche, trying to differentiate itself from the competition by specialising in a particular type of product.

When counting frequencies for each type of retailers, it was found the most common category corresponded to traditional retailers, representing 42.55% of the sample (120 retailers). These were followed by integral retailers with 33.33% of the sample (94 retailers) and specialised retailers with 24.11% of the sample (68 retailers). This description fits the idea of traditional retailers as the most common type, representing a set of strategies and factors that is common among many Colombian urban retailers, who often lack capabilities for a better management at their stores.

Finally, the transaction volumes for each type of retailer are listed in Table 6. Overall, the results seem to reinforce the idea of a low-scale, small operation, as most retailers show daily transaction volumes lower than 1 million Colombian pesos (COP) per day.

Table 6

*Category counts for daily transaction volumes of the retailer, per type of retailer*

		Type of retailer		
		Integral	Traditional	Specialized
Transaction volumes of the retailer, daily	Less than COP 500.000	41	79	26
	Between COP 500.001 and COP 1'000.000	36	31	24
	Between COP 1'000.001 and COP 3'000.000	16	8	15
	Between COP 3'000.001 and COP 5'000.000	1	2	3

### Results for the Cluster Analysis on Business Portfolios

After the previous cluster analysis on retailers, a cluster analysis on the products offered by banking correspondents was carried out, using a k-means cluster analysis and taking numbers of transactions for each type of these as factors. Results appear in Table 7.

Table 7

*Results for the cluster analysis on banking correspondent portfolios*

	Type of business portfolio		
	Money transfers	Banking services	Utility payments
Account withdrawals	0.0	13.5	.5
Social program withdrawals	0.0	1.4	.1
Credit disbursement	0.0	2.7	0.0
Deposits	0.0	9.7	.4
Financial payments	0.0	4.6	.4
Utility payments	0.0	6.0	7.1
Tax payments	7.5	3.8	.7
Tickets for events	0.0	1.4	0.0
Account openings	0.0	6.2	.1
Balance enquiries	2.5	13.7	.2
Issuance of banking statements	0.0	1.6	0.0
Reception of credit requests	0.0	3.9	.1
Fund transfers	0.0	6.3	.2
Money transfer reception or delivery	41.0	5.0	.9
Buy and sale of hard currency	0.0	3.8	0.0

Taking a quick look at these results, it could be noticed that there are three particularly differentiated portfolios, according to the BC's transaction levels. First, there is a portfolio mainly focused on money transfers and tax payments which, coupled with their relatively high volumes, lead to imply high cash rotation at the correspondent. The second portfolio stands out by the importance of information transactions such as balance enquiries and banking statements, while showing the highest number of transactions in multiple categories. Finally, the third portfolio is mostly limited to utility payments, with some offering money transfers, which indicates a very limited portfolio, designed for retailers with limited capabilities and limited transactions for banking services.

Also, when looking at the number of banking correspondents following each of these portfolios, there was an interesting finding. The "money transfers" portfolio was the least employed, with only 2 out of 106 BCs. It was followed by the "banking services" portfolio, with 11 out of 106. Finally, the most common portfolio was that one known as "utility payments", with 93 out of 106, or 87.7% of the sample. Table 8 displays the average number of transactions for each business portfolio.

Table 8

*Average number of transactions, per business portfolio*

	Type of business portfolio		
	Money transfers	Banking services	Utility payments
Number of transactions, per month	1308	2121	277

From the above, it could be stated that the most common product portfolio among banking correspondents is very limited on both the number of authorised transactions and the transaction volumes, in order to ensure coverage. It could be stated there is still untapped potential for offering banking services through the channel. Accompanied with an adequate assessment of the retailers' capabilities and the expected transactions for these services, these

could become a new input to maximise the number of transactions and, therefore, the profitability of the channel as a whole.

### Hypothesis Testing

In order to test the hypotheses associated to the research questions, a series of tests was run. For the third question, “*is the type of retailer a relevant differentiator for the transaction volumes of these?*”, a Kruskal-Wallis H test was run to decide whether to accept or reject the null hypothesis. The results are displayed in Table 9.

Table 9

*Kruskal-Wallis H test between types of retailer and retailer performance*

	Sales volume
Chi-square	19.101
Df	2
Asymptotic sig.	.000

Table 9 directly seeks to answer this research question, as it allows to observe whether there are significant differences in the means for transaction volumes among different types of retailers. From the result, it could be stated there seems to be significant differences in the means between groups, thus leading to the acceptance of the alternative hypothesis.

For the secondary question number 4, “*is the type of service portfolio allocated to banking correspondents a relevant differentiator for the number of transactions performed by these?*”, a one-way ANOVA between the types of business portfolio obtained from the second cluster analysis, and banking correspondent performance measured through the total number of transactions, was carried out, with the results displayed in Table 10.

The Table 10 allowed observing if there are significant differences in the means for the number of transactions among different types of retailers. The results for the one-way ANOVA supported the alternative hypothesis, thus concluding that there are significant differences on numbers of transactions between different types of business portfolio.

Table 10

*One-way ANOVA between types of business portfolio and banking correspondent performance*

	Sum of Squares	df	Mean Square	F	Sig.
Between groups	34,794,276.632	2	17,397,138.316	163.518	.000
Within groups	10,958,442.010	103	106,392.641		
Total	45,752,718.642	105			

Finally, in order to test the null hypothesis associated to the question number 5, “*are the type of retailer and the type of service portfolio interrelated when analysing the number of transactions of banking correspondents?*”, a two-way ANOVA was carried out, with both types of retailers and types of business portfolio as the independent variables, and number of banking correspondent transactions as the dependent one.

The results for the two-way ANOVA are listed in Table 11. It shows that, on the one hand, there are differences on transaction volumes when analysing both types of retailer and types of services at the same time. Also, it shows there is a significant interaction between the types of retailer and the types of portfolio. Therefore, the null hypothesis for this question had to be rejected as well, thus leading to the acceptance of the alternative hypothesis.

Table 11

*Two-way ANOVA between types of retailer, types of business portfolio, and banking correspondent performance*

Source	Type III Sum of Squares	df	Mean Squared	F	Sig.
Corrected model	36,437,860.121	7	5,205,408.589	54.765	.000
Intercept	27,343,483.388	1	27,343,483.388	287.676	.000
Type of portfolio	32,510,686.712	2	16,255,343.356	171.020	.000
Type of retailer	817,050.866	2	408,525.433	4.298	.016
Type of portfolio Type of retailer	1,230,882.159	3	410,294.053	4.317	.007
Error	9,314,858.521	98	95,049.577		
Total	71,007,696.000	106			
Corrected total	45,752,718.642	105			

### Chance-constrained programming model formulation

Finally, in order to respond the propositions associated to the first question, *How could a bank select retailers to become banking correspondents and allocate a service portfolio to these given a particular set of restrictions associated with the latter?*, the chance-constrained programming model was created, with a description of its final results obtained from the data set employed for running it, where the set of constraints and parameters come from a specific bank selected for this phase, that must be changed in case the model needs to be applied to select banking correspondents for another bank; the results shall be shown in the next paragraph.

The final model ended up possessing 322 variables, 181 binary variables and 141 integer variables, as well as 889 constraints, all of these linear. The model was programmed by using AMPL, through the CPLEX solver. The optimal solution is summarised in Table 12. The pairs of indices  $(j, k)$  for the BC and delegation type to assign correspond to the binary variables  $Y_{jk}$ . According to the selection constraints whose limits (minimum of transactions in each delegation model) vary according to the bank, it was found that eight retailers could be opened as BCs, from a universe of 27 feasible retailers, in which four were opened under the partial delegation model ( $k = 2$ ), three under a total delegation model ( $k = 3$ ) and one retailer with two different delegation types from different network managers, showing different portfolios for each delegation model on which it was opened. The “no delegation” model was not significant in the study, thus showing that said relationship model is no longer employed by banks.

In Table 12, the column  $(h)$  denotes the service type offered by a bank at the BC  $j$  under delegation type  $k$ , with all observations for the  $X_{jkh}$  variable taking a value of either 0 or 1. For example, on the solution summarised, the BC number ( $j = 7$ ) shall be opened under the full delegation model ( $k = 3$ ) for offering non-financial cash-in services ( $h = 4$ ). Only



one retailer ( $j = 24$ ) showed two different delegation modes, these being partial ( $k = 2$ ) and total ( $k = 3$ ), in which a different was allocated for each delegation model, under each contract. Thus, for ( $k = 2$ ) the allocated portfolio included information transactions ( $h = 1$ ), cash-out operations ( $h = 2$ ), and financial cash-in operations ( $h = 3$ ). Meanwhile, for ( $k = 3$ ) at the same retailer, non-financial cash-in operations ( $h = 4$ ) were allocated to the retailer under the contract with said delegation model.

Table 12

*Results for the location-allocation problem*

Objective value \$1,608,950.						
Allocation for a BC delegation model (j, k) [variable $Y_{jk}$ ]		Allocation for a portfolio (h) [variable $X_{jkh}$ ]	Transaction numbers for type of portfolio (h) [variable $Z_{jkh}$ ]			
(j)	(k)	(h)	1	2	3	4
7	3	4				304
9	3	4				304
10	2	3, 4			1	275
13	2	1, 4	29			360
14	3	1, 4	49			288
16	2	4				288
18	3	1, 4	29			304
24	2	1, 2, 3	49	31	233	
24	3	4				384

Based on the data set employed to run the chance-constrained programming model, the baseline solution delivered COP 1.608.950 millions of expected monthly profit, due to a number of transactions, estimated by the variable  $Z_{jkh}$  that is associated to the restrictions to each type of retailer. That is, the BC number ( $j = 7$ ) who was authorised to perform non-financial cash-in operations ( $h = 4$ ) would perform 304 monthly transactions of this type.

## Chapter 5: Conclusions and Recommendations

The need of bancarization for marginalised populations became a driver for governments and the financial sector as a whole, which in turn led to the creation of new figures serving as a bridge between the public and financial institutions (Garrido et al., 2011). This aspect has encouraged in governments the use of BCs as an alternative channel through which people gain access to financial services from which they were excluded and this in turn has meant that banks can reach regions formerly considered to be unprofitable to cover (Fundación Analistas Financieros Internacionales, 2011, p. 3). However, the development of financial inclusion policies in Colombia has not led to the opening of a banking correspondent system that is sustainable enough for all banking correspondents to operate without needing subsidies.

In this sense, the current study sought to help in the development of financial inclusion in Colombia through the development of the BC channel, by improving banks' management with a quantitative tool for the location-allocation processes associated to the selection and opening of banking correspondents in Colombian urban zones, besides expanding the research on the channel in the country; all of the above with the intention of ensuring the profitability of the channel, by taking the capabilities of the retailers into account. A method formed by five stages which comprise a combination of taxonomies, cluster analyses and analyses of variance meant to analyse the channel and its current status in Colombia and chance-constrained programming model for the location-allocation process, was developed to reach these goals.

Therefore, this methodology developed by this research proposed a solution against the current inefficiencies of the BC model that depends of public subsidies with the aim to select from a set of retailers the banking correspondents with the relevant capabilities to do this activity. Despite having been performed in Bogotá, the largest city in Colombia, this

method could prove to be relevant in other contexts, including rural areas and other developing countries.

Parting from the above, the conclusions of the research shall be put forward, in which an analysis will be conducted on the research questions and the hypotheses, reaching a conclusion on the latter parting from the results obtained in chapter 4. Next, both academic and practical contributions are going to be displayed. Finally, recommendations shall be delivered. These recommendations are targeted to both banks and other stakeholders in the banking correspondent business interested in improving channel results, as well as to researchers who might be interested in advancing studies on the channel.

### **Conclusions**

By making use of a quantitative paradigm, the current research proposal has sought to answer the following research questions: “How could a bank select retailers to become banking correspondents and allocate a service portfolio to these given a particular set of restrictions associated with the latter?”, “Which are the main criteria for the analysis by the banks of retailers poised to become banking correspondents in Colombian urban zones?”, “Is the type of retailer a relevant differentiator for the transaction volumes of these?”, “Is the type of service portfolio allocated to banking correspondents a relevant differentiator for the number of transactions performed by these?”, and “Are the type of retailer and the type of service portfolio interrelated when analysing the number of transactions of banking correspondents?.

The main conclusions of this study are:

*On the way banks should select potential banking correspondents from a set of retailers, with the purpose of offering banking portfolio services while taking their particular constraints into account.*

The current research proposes a method comprising five stages, for retailers in Colombian urban zones to be selected by banks as potential banking correspondents, in order

to maximise number of transactions and profitability from the operations performed through the channel.

1. The chance-constrained programming model, which incorporates general constraints related to costs and retailer capabilities, besides the strategic goals of banks, determines the potential business portfolio to be offered by banking correspondents in accordance to the capabilities of potential retailers.

The model was applied on a subzone in Bogotá, which had 27 feasible retailers, giving as a result the presence of 322 variables and 889 real constraints. It was concluded that eight of the 27 retailers should be selected to become banking correspondents, as these are able to obtain an income of COP 1'608,950 per month according to the procedure. For the execution of this stage, it was required to develop the previous stages, as these allowed the construction of the parameters included in the model. Greater delegation levels for banking correspondents depend on these possessing greater capabilities.

2. The development of a taxonomy of the network integration models and the financial services was performed in order to identify: (a) the activities associated with the operational management of BC networks, (b) the actors involved in the development of those networks, (c) the *drivers* associated with the development of the BC channel, and (d) the association of that channel with groups of financial services.

3. The development of a taxonomy on small and medium retailers through the analysis of their functional and business strategies was performed in order to learn the capabilities and restrictions of the retail when offering the service.

4. Two k-means cluster analyses were conducted. The first one is made through the deployment of a principal component analysis that allows to group the retailers shortlisted to become BCs, according to functional and business strategic factors. The second one is made

through a Ward hierarchical cluster, in order to classify BCs according to the numbers of transactions for the multiple financial services offered by each of these.

5. The validation of the cluster analysis comes from an ANOVA and a Kruskal-Wallis H test. These tests are made to prove that the clusters constitute a differentiator when measuring the performance of BCs and to test the existence of a relationship between groups of retailers and those of service portfolios observed in BCs.

This methodology allows to develop integration and operational activities set taking into account that this process chooses the banking correspondents and assigns them a set of activities according to their capabilities. The former generates an integration network between banks and banking correspondents that works according to the integration models defined by Jayo et al. (2011).

*On the main criteria used by banks to analyse potential retailers that might become banking correspondents in Colombian urban zones.*

In Colombia urban zones, banking correspondents are mainly defined by potential customer transactions, strategic goals of banks, the participation of third parties in operations, and cash management. This conclusion is obtained from the development of the taxonomy on network integration models and banking services, based on information collected through the semistructured interviews conducted for the research. The main goal of this procedure was gaining knowledge on the banking correspondent channel in Bogotá, Colombia, and the involved parties.

Said taxonomy should serve as a criterion to be taken into account by banks when analysing the potential candidates to open a banking correspondent, as well as the financial services portfolio these would be able to offer. The main elements that must be considered during the elaboration of this taxonomy are:

1. The mode in which cash is managed by retailers (cash management). The main issues to be taken into account are: (a) cash amounts that are managed, especially since it is often required that banking correspondents use their own cash to perform transactions. (b) Logistics and money transport, as this represents a difficulty due to factors such as communications, location and security.

2. Transaction volumes and different policies on the minimal requirements that must be fulfilled by those retailers seeking to offer banking correspondent services. This point in particular is important as it reflects a lack of consensus among banks on which should be the requirements a retailer must comply to become a banking correspondent. The former is exemplified on the lack of use of the electronic devices deployed to perform these operations, as the 2013 Financial Inclusion Report from SFC and BdO (2014) stated.

3. Strategic goals of banks, which include an increase in the number of banking correspondents and the way to approach retailers. On the drivers behind expansion, the same causes identified by Jayo et al. (2011) in Brazil were found in Colombia, including the need to decongest banking branches and increase coverage in remote locations. On the way to approach retailers, banks highlight the insistence on the profits banking correspondents could obtain from each transaction.

4. The final relevant element to this taxonomy is the delegation level of banking correspondents, as allocated by the banks. According to the interviews, multiple delegation models that look similar to those resulting from the work of Jayo et al. (2011) in the Brazilian case were found. Thus, the method designed throughout the current research contemplates three potential delegation models: full delegation, partial delegation and no delegation.

The results from the application of the chance-constrained programming process show that, of the eight retailers selected to become banking correspondents, three must operate under a full delegation model, four should be opened under a partial delegation model, and

one of these should work under two different types of delegation, for two different network managers. This result also shows the irrelevance of the no delegation model at the analysed population, despite being mentioned in the research of Jayo et al. (2011) as relevant for the Brazilian case.

*On whether the type of retailer is a relevant differentiator for the transaction volumes of the retailer on its main activity.*

The results of the research show that, following the proposal of Ramakrishnan (2010), the different types of retailer can be classified in accordance to their functional and business strategies. In order to answer this question, a taxonomy on these two strategies was built, followed by a cluster analysis on retailers and a Kruskal-Wallis H test with both a null hypothesis and an alternative hypothesis.

H0 (1): The transaction volume of retailers is the same for all types of retailer.

H1 (1): The transaction volume of retailers varies according to the type of retailer.

The Kruskal-Wallis H test, applied on the sample, led to conclude there is a statistically significant difference in the transaction volumes for the different types of retailer, thus rejecting the null hypothesis and accepting the alternative hypothesis. It is therefore concluded that the type of retailer is a relevant differentiator for the transaction volumes observed in the main activity of the retailers.

*On whether the type of business portfolio allocated to banking correspondents constitutes a relevant differentiator on the number of transactions performed by these.*

Parting from the research of Jayo et al. (2011), banking correspondents can be classified according to the business portfolios allocated by banks, formed by services that are either financial, non-financial or information. Just like the previous question, a taxonomy was built to solve this problem, now on the financial services and network integration models. It was followed by a cluster analysis using the information gathered from the questionnaires on

banking correspondents; with a one-way ANOVA, intended to test a null hypothesis and an alternative hypothesis, being performed by using the categories defined by the cluster analysis.

H0 (2): The total number of transactions of banking correspondents is the same for all types of service portfolio delegated by banks.

H1 (2): The total number of transactions of banking correspondents varies according to the type of service portfolio delegated by banks.

The obtained results allow to reject the null hypothesis and to accept the alternative hypothesis. The one-way ANOVA test also suggests there is a statistically significant difference on the average numbers of transactions between the multiple types of business portfolio delegated by banks. Thus, it was concluded from this research that the type of business portfolio allocated to a banking correspondent is a key differentiator on the total number of transactions performed by these.

*On whether the type of retailer and the type of business portfolio are interrelated when analysing the number of transactions performed by banking correspondents.*

A null hypothesis and an alternative hypothesis were formulated to solve this point.

H0 (3): The type of retailer and the type of service portfolio do not interrelate with each other when analysing the total number of transactions of banking correspondents.

H1 (3): The type of retailer and the type of service portfolio are interrelated with each other when analysing the total number of transactions of banking correspondents.

The two-way ANOVA test shows that, on the one hand, there are significant differences in the number of transactions when analysing types of retailer and types of portfolio simultaneously; on the other hand, there is a significant interaction between the types of retailer and the types of portfolio. Therefore, the null hypothesis is rejected, accepting the alternative hypothesis and leading the research to conclude that the type of



retailer and the type of service portfolio are interrelated when analysing the number of transactions performed by banking correspondents.

## **Contributions**

### **Theoretical contributions**

First, the results give an empirical support to the findings of Diniz (2010) in the Brazilian case, as limitations on the offering of services by services delegates were found, parting from the fact that this activity did not pose a highlight on the business portfolio of these. In this case, a research work focused specifically on the relationship between banking correspondents and microcredit could create a parallel development just as it was delivered by this author in Brazil. Likewise, the conclusions add to the results of Jayo and Diniz (2009), in the sense these conclusions support utility payment services as one of the main drivers behind the expansion of banking correspondents.

Second, the current research also gives empirical support and expands upon the findings of Jayo et al. (2011), regarding the operation of the delegation models developed throughout that research work. Thus, the current study reveals the relevance of the full delegation and partial delegation models in the analysed Colombian urban zones, as shown by the results; at the same time, it excludes the no delegation model from this particular context. Empirical evidence is also delivered on the partial delegation model, which was underdeveloped in the work of Jayo et al (2011), besides highlighting the need to develop mixed models with multiple simultaneous delegation types, as shown by one of the banking correspondents selected from the application of the chance-constrained programming model.

The current research also expands upon the findings of Jayo et al (2011) by adding more variables to the analysis on the services delegates and the cash amounts handled by them, as well as the transactions where these originated from. Finally, evidence was added

regarding the possibility of classifying the delegates (in this case BC) according to the business portfolios that services suppliers allocate to them.

Third, this work widens the knowledge on the channel for the Colombian case, highlighting the reliance on subsidies for the channel's expansion as an issue. The theoretical contribution of the research is important when considering it proposes a methodology to locate services delegates from a determinate channel, following sustainability criteria that respond both channel and market needs better than subsidies. This research also contributes through the proposal of an optimisation model, which was deployed in this scenario to analyse the transactions performed by the services delegates, in order to solve the uncertainty problem.

Fourth, a contribution is done to the findings obtained by Ramakrishnan (2010) on his research on the channel, and it was possible to apply the taxonomy on business strategy differentiation performed by this author, carefully adapted to Colombian context because the similarities of the channel characteristics between Colombia and India, slightly expanding knowledge on these parties regarding their financial and transactional information. Besides, empirical evidence on the possibility of classifying organizations in the channel according to their functional and business strategies was added.

Fifth, the elaboration of this methodology constitutes a contribution to the applications of the agency theory (Eisenhardt, 1989), as it manages to align the interests of banks and banking correspondents through a selection procedure that lowers the impact of high transaction costs and channel inefficiencies. The absence of such method impedes to reconcile the interests of both parties, as there are no incentives for the principal to be related with the agent beyond subsidies delivered by the Colombian State. Thus, this methodology delivers the basis for the construction of an adequate governance structure that maximises the principal's income (Jensen and Meckling, 1976) -this being the bank- at the same time that

incentives are given to the agent -defined as the banking correspondent – to align its interests, leading to an expanded service portfolio and increased transactional efficiency. Therefore, this methodology diminishes potential agency problems as it is an efficient assessment for the opportunity cost between risk and return (Hughes and Mester, 2008), due to the fact the chance the banking correspondent ends up being inefficient by not taking its capabilities into account; plus, agency costs are minimised through the allocation of the role as banking correspondent.

### **Practical contributions**

The main practical contribution of the current study lies on the elaboration of a consistent methodology that enables to offer a set of services selecting potential delegates in a determinate channel following constraints on sustainability and capabilities.

The former implies that the methodology developed by the current study allows increasing the physical presence of service providers, reaching the poorest people as recommended by Yokomizo, Diniz, and Christopoulos (2010); thus lifting some of the limits on the access to a set of services, related to service delivery, which also attends the suggestion of Mas and Siedek (2008). This scenario is ideal as it is not required to invest large amounts in capital or subsidies, thus allowing the expansion of correspondents while making more moderate financial efforts (Mas, 2008).

The current research also shows an approach to improve management of the relationship between a sector that offers determinate set of services and a channel, through greater knowledge on the former and the parties involved in its operation. So far, the relationship between the parties has been carried out in an empirical manner, without considering the existing differences between the characteristics and components of the channel, and even without considering the constraints and capabilities on the former, deriving from its market approach, business strategies, and patronage, among others.

By taking the former into account and in virtue of the results delivered by the current research, both organizations that offer services and network integration managers should take the studied variables into account in order to attain an adequate approximation to the channel, which would allow to improve the delegate performance on the services. This new knowledge could help, in practice, to correct errors and inefficiencies of the channel, as well as stimulating the diffusion of sustainable relationships.

## **Recommendations**

### **Practical recommendations**

Based on study results, the following recommendations are proposed:

First: the current research could lead to discuss the following subjects: (a) the determination of types of retailer, as a key piece to obtain an adequate approach to portfolio allocation and the performance of the retailer as a BC, (b) channel performance, analysed from the constraints of retailers operating as BCs; identifying that not all retailers possess the same capabilities and conditions, and (c) improvements in performance through a capabilities increase in the channel restrictions and the involved parties; the identification and knowledge of the channel allows to point the aspects that require more effort to improve channel management.

Second: it is suggested to banks and network integration managers that, parting from the selection of a retailer to operate as a BC, they clearly define the opening parameters to be used by the organisation, as well as research to classify the retailer into one of the groups proposed at the current research.

Third: banks and network integration managers must constantly redefine these constraints, due to the fact that the BC market is a dynamic market, subject to the inclusion policies of the Colombian national government.

Fourth: eliminate and reallocate a business portfolio from banking correspondents found to be inefficient due to (a) gaps between supply and demand, which leads to underperformance on multiple services; and (b) their strong reliance on government subsidies. The money destined to such subsidies could be reallocated to other channels that could allow to reach a greater bancarization levels for the Colombian population.

Fifth: analyse which parts of the BC portfolio have not been delegated in an effective manner and how this could be related to the features of the retailers that offer financial services portfolios. The former could be part of the solutions to overcome low bancarization levels in Colombia when compared to the rest of Latin America.

### **Recommendations for further study**

Based on study results and its limitations, the following subjects are proposed for future research:

First: applying the model while taking into account the evolutionary trend of the competition in the subzone where the retail is located, since competition arrives faster to the best locations, which impacts on estimates of utility payments transactions in a greater proportion than on estimates of financial transactions in that same location.

Second: running the model under a dynamic simulation that shows the effect of the credit line as a critical variable in the operations of the retailer as a BC, therefore viewing the agency relationship between the bank and the BC from this point of view, allowing to improve channel operations and enhance the capabilities subjected to these constraints.

Third: this research opens a new field of knowledge for further studies on the selection of banking correspondents and the financial inclusion in other developing countries. Parting from the findings of the current study, new research could be developed on the context of other Latin American countries, in which banking correspondents have gained traction and where there is not enough knowledge on channel status. Two of the potential candidates

would be México, the country with the highest growth rate for the channel, reaching 40.7% in the period 2010-2013 (Consejo Nacional de Inclusión Financiera, 2014, p. 44); and Perú, where the channel reached a share of 19.2% of total financial transactions in 2014, which shows strong adoption when compared to the same number in Colombia, where the channel barely reached a share of 3% for that year (Asbanc, 2014). A third one could be Brazil, which would benefit from existing literature on the taxonomy and description of the channel, as well as from its current status as a developed banking correspondents market, but would still miss a component of analysis on retailers, as well as on the application of a tailor-made, chance-constrained programming model.

Fourth: a particular limitation of the current study lies on the fact that the analysis on banking correspondents was restricted to Colombian urban zones, leaving aside the particularities that might appear in the channel at rural zones, such as higher cash management costs and risks due to safety issues, remoteness and deficiencies on road and communications infrastructure, requiring a higher number of transactions to justify their implementation. It is therefore important to suggest that future researchers formulate new selection methods for banking correspondents that include the challenges associated to implementation, expansion and sustainability of the channel at rural zones and small urban locations whose income, consumption, formal economy and financial inclusion levels are much different than those of the zones herein analysed.

Fifth: a research that goes deeper on the relationship between banking correspondents and microfinance, and also inquires on the low reach of microcredit services through the BC channel in Colombia, is crucial to keep promoting financial inclusion among the low-income population. The former is relevant due to the ability of microcredit services to operate as a mechanism against poverty traps.

Sixth: the development of a comparative study between different countries or zones could be interesting as a tool to understand the different expansion drivers behind BCs, according to the features of particular contexts. This could help to find potential solutions that could be deployed on BC implementation and expansion issues, in similar contexts through the adaptation of methods like the one proposed in this research study.

Seventh: the application of the techniques mentioned in the current research proposal on countries in which the banking correspondent channel is still under development. Potential candidates could be Chile, Ecuador, and some Central American countries. From the above, a greater understanding of the channel in these countries could be gained. Also, given the fact these are in early implementation stages still, the results from the methodologies could shape more decisively the deployment of banking correspondents in these countries, potentially leading to a more sustainable channel, able to avoid some of the issues found in other Latin American countries.

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## Appendix A: General Guidelines for the Semi-Structured Interviews

Expertos considerados en la entrevista semiestructurada:

### Bancos

- Bancolombia
- AV Villas
- Colpatria
- Citibank
- Davivienda
- Banco de Bogotá
- BBVA

### Redes de gestión de redes.

- Movilred
- Fullcarga
- Baloto
- Conexred

### Gobierno

- Banca de las Oportunidades
- Superintendencia financiera
- Beatriz Marulanda

### Telcos

- Transfer
- Daviplata

### Empresas de logística de efectivo

- Prosegur
- Atlas Transvalores.

- GS4

Redes transaccionales no financieras

- Multipay
- Processa
- Carvajal

Redes de Bajo Valor

- Redeban
- Credibanco

Generalmente las entrevistas deben durar aproximadamente una hora. Es recomendable que no se extienda por más de 90 minutos.

Puntos de referencia para la entrevista semiestructurada.

1. Años de experiencia en el canal de CB.
2. Descripción de sus operaciones y funciones asociadas a la corresponsalía bancaria.
3. Drivers que permitieron el crecimiento del canal
4. Información relacionada con:
  - a. Identificación de los actores principales (bancos, redes, etc. Preponderancia de éstos), desde su punto de vista.
  - i. Participación de los actores.
  - b. Cobertura geográfica sus operaciones en el territorio nacional.
  - c. Concentración de operaciones en regiones específicas (departamentos con demasiada presencia, rurales, urbanos etc.).
  - d. Portafolio de productos y servicios ofrecido en este canal. (tipos de transacciones)

CATEGORÍA	TIPO DE TRANSACCIÓN	Marcar con una (x) los servicios que se presentan en el canal
RETIROS	Cuenta bancaria	
	Programas sociales	
	Desembolso de créditos	
CONSIGNACIONES	A cuentas bancarias	
PAGOS	<i>Obligaciones Financieras</i>	
	Servicios Públicos	
	Impuestos	
RECARGAS DE SERVICIOS		
PREPAGO	Teléfonos prepago	
	Juegos de azar	
	Tarjetas de transporte público	
	Servicios domésticos (Internet, TV, telefonía fija)	
	Subsidios	
RECAUDOS DE TERCEROS		
	Entradas (Eventos, juegos y espectáculos)	



OTROS		
RELACIONAMIENTO	Apertura de cuenta	
	Consulta de saldo	
	Extracto Bancario	
	Solicitud de créditos	
	Solicitud de tarjetas de crédito	
	Compra de Seguros	

e. Actividades y procesos asociados al funcionamiento del canal (explicación detallada, tanto como sea posible). Actividades comerciales y de negocios y Actividades tecnológicas y logísticas.

i. Internos

ii. Delegación (es decir: quién está a cargo de ejecutar las diferentes actividades y procesos). (cuando es un gestor preguntar el alcance del mismo dentro de la operación y la experiencia con el mismo- ventajas y desventajas)

f. Manejo del tema de cupos y manejo del efectivo con esos negocios (con recursos propios, terceros, etc.), manejan pólizas, etc. Eso cuenta representa del total de costos del servicio, etc. Los bancos les ayudan, etc.

g. Estrategias de selección de corresponsales. (identificar características relevantes en la selección de un comercio a vincular). Qué documentos o estudios exigen.

h. ¿Cómo garantizan que los puntos cumplen con las exigencias de la red?

i. Niveles de demanda para cada tipo de producto o servicio.

j. **Perfiles de los clientes y usuarios del canal de corresponsalía bancaria:** entre los clientes que poseen algún producto financiero, **¿cuál es la participación estimada para cada uno de éstos?** Tome las siguientes definiciones

Joven infantil	o Persona natural menor a 26 años de edad, con productos para jóvenes (cuenta joven, TC joven, etc.)
Persona natural	Persona natural mayor a 26 años de edad, con productos financieros comunes
Nómina	Persona natural, que cuenta con una cuenta de nómina para recibir el pago de sus salarios
Cliente élite	Persona natural, con un portafolio de servicios especial y alto ingreso (TC dorada, inversiones, etc.)
MiPyME	Compañía con 200 trabajadores o menos, activos iguales o menores a treinta mil (30.000) SMMLV
Gran empresa	Compañía con más de 200 trabajadores, activos superiores a treinta mil (30.000) SMMLV

	Participación estimada
Persona natural - joven o infantil	
Persona natural	
Persona natural - nómina	
Persona natural - cliente élite	

MiPyME	
Gran empresa	

- k. Para cada uno de estos tipos de cliente, ¿cuáles son las transacciones más demandadas?. Estos números pueden oscilar entre 1 y 7, con 1 indicando el tipo más frecuente y 7 el menos frecuente.

	Joven o infantil	Natural	Nomina	Élite	Mipyme	Gran empresa
Retiros						
Consignaciones						
Pagos						
Recargas de servicios prepago						
Recaudos de terceros						
Otros						
Relacionamiento						

- l. Segmento de banca (información sobre los segmentos de banca existentes en Colombia).

<i>modelo aditivo</i>	Los servicios son entregados a personas ya bancarizadas
<i>modelo transformacional</i>	Se diseñan servicios que procuran por la inclusión financiera de la población.

	Participación en el canal	Volumen transaccional
Aditivo		
Transformacional		
Otros servicios		

m. Problemas detectados en la legislación existente en el país para el desarrollo del canal.

5. ¿Ve alguna relación entre el nivel de delegación en las actividades y el portafolio de servicios de los corresponsales?

## Appendix B: Survey Applied on Retailers

### Cuestionario sobre comercios en Colombia

Fecha	
Entrevistadores	
Ubicación	
Nombre del comercio	
Actividad del comercio	
Dirección del comercio	

Por medio de esta encuesta se recogerá información sobre las estrategias comerciales y de negocios utilizadas por los comercios en Colombia, para crear perfiles de comercios según dichas estrategias. Por estrategias operacionales se entenderán aquellas asociadas al funcionamiento diario del negocio, mientras que las estrategias de negocio están ligadas a los planes y el funcionamiento del negocio, en un nivel más general.

#### SECCIÓN 0 - Características generales de los comercios

1. ¿El establecimiento de comercio se encuentra sobre una vía principal o vía de acceso? (única respuesta)

1. Si	2. No
-------	-------

2. ¿El establecimiento de comercio se encuentra a media cuadra o 50 mts de un paradero formal u informal o estación de bus? (única respuesta).

1. Si	2. No
-------	-------

3. ¿A qué hora abre el establecimiento? (única respuesta).

1	6 AM - 8 AM
2	8:01 AM - 10 AM
3	10:01 AM - 12 PM
4	3:01 PM - 5 PM
5	5:01 PM- 8 PM

4. ¿A qué hora cierra el establecimiento? (única respuesta).

1	4 PM - 6 PM
2	6:01 PM - 8 PM
3	8:01 PM - 10 PM
4	10:01 PM - 12 PM
5	12:01 PM - 3 AM

5. ¿Hace cuánto tiempo montó este negocio? (única respuesta).

1	Menos de un año.
2	Entre un año y tres años.
3	Entre tres años y cinco años.
4	Entre cinco años y diez años.
5	Más de diez años.

6. ¿Cuál es su promedio de ventas diario? (única respuesta).

1	de 0 a 500 mil pesos.
2	Entre 500 mil y un millón de pesos.
3	Entre un millón y tres millones de pesos.
4	Entre tres millones y cinco millones de pesos.
5	Más de cinco millones de pesos.

7. ¿Cuál es el área del local, en metros cuadrados? (única respuesta).

1	Menos de 20 metros cuadrados.
2	Entre 21 y 50 metros cuadrados.
3	Entre 51 y 80 metros cuadrados.
4	Entre 81 y 100 metros cuadrados.
5	Entre 101 y 400 metros cuadrados.

8. ¿Cuántos empleados trabajan en el local? (empleados entiendese por personas remuneradas, el propietario de la tienda cuenta si trabaja en ella)- (única respuesta).

1	Entre 0-1 empleados
2	Entre 2-4 empleados
3	Entre 5-7 empleados
4	Entre 7-9 empleados
5	Más de 10 empleados

9. ¿Cuántas cajas registradoras tiene en su establecimiento - (única respuesta)?

1	Entre 0-1
2	Entre 2-4
3	Entre 5-7
4	Entre 7-9
5	Más de 10 cajas registradoras

10. Cuantos metros lineales de estanterías tiene el establecimiento - (única respuesta).

1	Entre 0-1
2	Entre 2-4
3	Entre 5-7
4	Entre 7-9
5	Más de 10 metros

11. Cantidad de refrigeradores en el establecimiento - (única respuesta).

1	Entre 0-1
2	Entre 2-4
3	Entre 5-7
4	Entre 7-9
5	Más de 10

12. Cantidad de sillas para los clientes- (única respuesta).

1	Entre 0-5
2	Entre 6-10

3	Entre 11-15
4	Entre 15-20
5	Más de 20

13. ¿Trabaja en jornada continua? (la jornada continua es trabajar sin parar de la apertura al cierre del establecimiento, por ejemplo: trabajar en la hora del almuerzo), (única respuesta).

1. Si	2. No
-------	-------

14. ¿Cuál es el día de inicio de las labores en el comercio? (única respuesta).

1	Lunes.
2	Martes.
3	Miércoles.
4	Jueves.
5	Viernes.
6	Sábado.
7	Domingo.

15. ¿Cuál es el día que finalizan las labores en el comercio? (única respuesta)

1	Lunes.
2	Martes.
3	Miércoles.
4	Jueves.
5	Viernes.
6	Sábado.
7	Domingo.

16. ¿A qué hora empieza la hora pico? (única respuesta).

1	6 AM - 9 AM
2	9:01 AM - 12 PM
3	12:01 PM - 3 PM



4	3:01 PM - 6PM
5	6:01 PM- 9PM

17. ¿A qué hora termina la hora pico? (única respuesta).

1	6 AM - 9 AM
2	9:01 AM - 12 PM
3	12:01 PM - 3 PM
4	3:01 PM - 6PM
5	6:01 PM- 9PM

18. ¿Cuántas personas visitan el establecimiento en hora pico? (numérica) - (única respuesta)

19. ¿Qué nivel educativo tiene el dueño del establecimiento? (única respuesta)

1	Ninguna
2	Primaria.
3	Bachiller.
4	Técnica / Tecnológica
5	Universitaria.
6	No sabe / no responde

20. ¿Su establecimiento cuenta con baños públicos dirigido a sus clientes? (única respuesta)

1. Si	2. No
-------	-------

21. ¿Tiene teléfono de uso público? (única respuesta)

1. Si	2. No
-------	-------

22. ¿El establecimiento cuenta con cámaras de seguridad? (única respuesta)

1. Si	2. No
-------	-------

23. ¿Cuenta con algún seguro contra siniestros o daños? (única respuesta)

1. Si	2. No
-------	-------

24. ¿Tiene datafono? (única respuesta)

1. Si	2. No
-------	-------

25. ¿Recibe para realizar pagos tarjetas de crédito? (única respuesta)

1. Si	2. No
-------	-------

26. ¿Recibe para realizar pago tarjetas de débito? (única respuesta)

1. Si	2. No
-------	-------

#### SECCIÓN 1A- estrategias operacionales

27. Para esta sección de la encuesta, se pondrá un listado de ítems, usted tendrá que indicar el grado de atención que le da a cada uno de éstos en el funcionamiento diario del negocio (marcar con una x)

ITEMS	Nulo	Bajo	Regular	Alto	Muy alto
1.Ofrece los productos más recientes en el mercado en su establecimiento (única respuesta)					
2.Tiene políticas de devoluciones e intercambios. (única respuesta)					
3.Facilita las compras de pequeñas presentaciones. (única respuesta)					
4.Ofrece productos frescos. (única respuesta)					
5.Promueve la buena voluntad y la confianza de sus clientes (única respuesta)					

6.Tiene descuentos en los precios. (única respuesta)					
7.Ofrece conveniencia al momento de la compra. (única respuesta)					
8.Tiene en el negocio marcas altamente reconocidas. (única respuesta)					
9.Ofrece servicios después de la compra de un producto a sus clientes (única respuesta)					
10.Tiene vínculos establecidos con proveedores. (única respuesta)					
11.Tiene en el negocio productos exclusivos, productos que no se consiguen en otros negocios. (única respuesta)					
12.Ofrece crédito a sus clientes. (única respuesta)					
13.Ofrece servicios antes de la compra de sus productos a los clientes (única respuesta)					
14.Su nivel de inventario es alto (única respuesta)					
15.Se preocupa usted por la acomodación de los productos en la tienda y la presentación de la mercancía. (única respuesta)					
16.Tiene productos alta calidad. (única respuesta)					
17.Tiene variedad en sus productos. (única respuesta)					
18.Ofrece entrenamiento a sus empleados. (única respuesta)					
19. Hace seguimiento de los precios de los competidores. (única respuesta)					
20.Realiza seguimiento de las actividades promocionales de los competidores. (única respuesta)					
21.Tiene programas de promociones para aumentar sus ventas. (única respuesta)					
22.Tiene precios por debajo de la competencia. (única respuesta)					

23.Sus productos son adecuados a la zona donde está ubicado su negocio. (única respuesta)					
24.Se preocupa usted por la iluminación y el sonido de su establecimiento. (única respuesta)					
25.Facilita a sus clientes compras de objetos al por menor. (única respuesta)					
26.Cuenta con marcas propias. (única respuesta)					
27.Ofrece domicilios. (única respuesta)					
28.Tiene campañas de promoción desarrolladas por usted mismo. (única respuesta)					
29.Cuenta con tecnologías digitales para hacer ventas y manejar los productos en bodega. (única respuesta)					

#### SECCIÓN 1B - estrategias de negocios

28. Para esta sección de la encuesta, se pondrá un listado de afirmaciones sobre estrategias, usted tiene que indicar hasta qué punto usted aplica cada una estas frases en el manejo de la tienda (marcar con una x).

ITEMS	Nulo	Bajo	Regular	Alto	Muy alto
1.Crece, atrayendo nuevos consumidores. (única respuesta)					
2.Se enfoca en un tipo específico de consumidores. (única respuesta)					
3.Compita con precios bajos, a partir de una base de costos bajos. (única respuesta)					
4.Posicionamiento claro comparado con los competidores. (única respuesta)					
5.Se posiciona en la zona por medio de la reducción de costos. (única respuesta)					
6.Las acciones que emprende le permiten la obtención de bajos costos. (única respuesta)					
7.Aumenta el precio de sus productos para reflejar el					

posicionamiento en el mercado. (única respuesta)					
8. Logra bajos costos por medio de relaciones con proveedores. (única respuesta)					
9.El crecimiento se ha logrado, ampliando la oferta de productos. (única respuesta)					
10.Retiene la lealtad del consumidor por medio de la atención. (única respuesta)					
11.Conoce las necesidades del cliente. (única respuesta)					
12.Ofrece servicios de alta calidad. (única respuesta)					
13.Cuenta con el reconocimiento en la zona. (única respuesta)					
14.Es más competitivo, por tener precios bajos. (única respuesta)					
15.Mantiene bajos gastos generales para poder ofrecer bajos precios. (única respuesta)					
16.Se consolida y afianza en el sector, incrementando la eficiencia. (única respuesta)					

29. ¿Es usted un corresponsal bancario? Si su respuesta es **SÍ** pase a la pregunta 30. De lo contrario, pase a la pregunta 31.

1. Si	2. No
-------	-------

30. ¿Que lo motiva a hacer corresponsal bancario?

1	Para obtener ingresos adicionales
2	Para atraer más gente a mi negocio.
3	Mis clientes esperaban que lo hiciera/me lo pidieron.
4	Quiero estar asociado con una gran compañía.

31. ¿Por qué razón usted no es corresponsal bancario?

1	No posee información respecto al negocio de corresponsalía.
2	No le genera confianza. (prefiere tener el dinero en efectivo)
3	No está bancarizado.
4	Los cobros que hacen los bancos por transacciones no son atractivos para usted.
5	Los impuestos que debe pagar.
6	No le genera los ingresos representativos.
7	No considera que cuente con la infraestructura pertinente.

## Appendix C: Survey Applied on Banking Correspondents

### Cuestionario sobre Corresponsales Bancarios en Colombia

El siguiente instrumento será aplicado exclusivamente sobre comercios que sean Corresponsales Bancarios

<b>Fecha</b>	
<b>Entrevistadores</b>	
<b>Ubicación</b>	
<b>Nombre del comercio</b>	
<b>Actividad del comercio</b>	

1. Marcar con una (x) cuáles son los nombres del banco y la red de pagos/apuestas/giros para los que es corresponsal. Puede marcar más de una opción de ser necesario. ( múltiples respuestas)

1	Banco AV Villas.
2	Banagrario.
3	BCSC.
4	Banco de Bogotá.
5	Banco de Occidente.
6	Banco Popular.
7	Bancolombia.
8	BBVA.
9	CITIBANK.
10	HSBC.
11	Tuya S.A.
12	Banco WWB S.A.
13	Colpatria S.A.
14	Finamerica S.A.
15	COMERCIACOOP.
16	Banco Falabella.
17	Giros y Finanzas.
18	Banco Davivienda S.A.
19	Bancamia S.A.
20	Cooperativa Financiera de Antioquia.
21	Mi Plata S.A.

22	Microempresas de Colombia.
23	Opportunity Internacional.
24	Movilred.
25	Baloto.
26	Puntored/Conexred.
27	Fullcarga.
28	Carvajal.
29	Copidrogas.
30	Paga Todo para Todo.
31	Pagafacil.
32	Gane.
33	Gana.
34	4 -72.
35	Servientrega.
36	Otro. Cual?

2. A parte de este comercio, cuantos establecimientos adicionales tiene que sean corresponsales bancarios? ( numérica)- ( única respuesta)

\_\_\_\_\_

3. Indique qué tan lejos se encuentra usted caminando de una sucursal del banco ( única respuesta)

1	entre 5 minutos y 10 minutos
2	entre 10 minutos y quince minutos
3	entre 15 minutos y 25 minutos
4	de 25 minutos y 35 minutos
5	Más de 35 minutos
6	No sabe/ no responde

4. Indique que tan lejos se encuentra caminando de otro corresponsal ( única respuesta)

1	entre 5 minutos y 10 minutos
2	entre 10 minutos y quince minutos
3	entre 15 minutos y 25 minutos
4	de 25 minutos y 35 minutos



5	Más de 35 minutos
6	No sabe/ no responde

5. ¿De la red/ asociada o banco con la que usted tiene vínculo, **escribir** quién le paga por los servicios de corresponsalía? ( única respuesta)

		Quien le paga?
1	Banco AV Villas.	
2	Banagrario.	
3	BCSC.	
4	Banco de Bogotá.	
5	Banco de Occidente.	
6	Banco Popular.	
7	Bancolombia.	
8	BBVA.	
9	CITIBANK.	
10	HSBC.	
11	Tuya S.A.	
12	Banco WWB S.A.	
13	Colpatria S.A.	
14	Finamerica S.A.	
15	COMERCIACOOP.	
16	Banco Falabella.	
17	Giros y Finanzas.	
18	Banco Davivienda S.A.	
19	Bancamia S.A.	
20	Cooperativa Financiera de Antioquia.	
21	Mi Plata S.A.	
22	Microempresas de Colombia.	
23	Opportunity Internacional.	
24	Movilred.	
25	Baloto.	
26	Puntored/Conexred.	
27	Fullcarga.	

28	Carvajal.	
29	Copidrogas.	
30	Paga Todo para Todo.	
31	Pagafacil.	
32	Gane.	
33	Gana.	
34	4 -72.	
35	Servientrega.	
36	Otro. Cual? y quien de éste le paga?	

6. ¿A partir de qué año es usted corresponsal bancario? ( única respuesta)

1	2006-2007
2	2008-2009
3	2010-2011
4	2012-2013
5	2014

7. ¿Cuáles son los equipos que utiliza para la actividad de corresponsalia? (múltiple respuesta) ( se marca la respuesta y se pregunta por cada ítem , si corresponde desde la pregunta 7a.)

1	Computador.
2	Datáfono.
3	Tableta.
4	Lector de código de barras.
5	Impresora
6	Estaciones

7a. Si tiene, Computador es: ( única respuesta) sino, pasar a la pregunta 7b.

1	De su propiedad.
2	Propiedad del banco.
3	Propiedad de la red asociada.

7b. Si tiene tableta es: (única respuesta) sino pasar a la pregunta 7c

1	De su propiedad.
2	Propiedad del banco.
3	Propiedad de la red asociada.

7c. Si tiene lector del código de barras es: (única respuesta), sino pasar a la pregunta 7d.

1	De su propiedad.
2	Propiedad del banco.
3	Propiedad de la red asociada.

7d. Si tiene impresora es: (única respuesta), sino pasar a la pregunta 7e.

1	De su propiedad.
2	Propiedad del banco.
3	Propiedad de la red asociada.

7e. Si tiene estaciones son: (única respuesta), sino pasar a la pregunta 8.

1	De su propiedad.
2	Propiedad del banco.
3	Propiedad de la red asociada.

8. ¿Del acuerdo que tiene de corresponsalía, **escribir** quién ejecuta labores de instalación, mantenimiento y soporte técnico? (única respuesta)

		Quién ejecuta instalación, mantenimiento y soporte técnico?
1	Banco AV Villas.	
2	Banagrario.	
3	BCSC.	
4	Banco de Bogotá.	

5	Banco de Occidente.	
6	Banco Popular.	
7	Bancolombia.	
8	BBVA.	
9	CITIBANK.	
10	HSBC.	
11	Tuya S.A.	
12	Banco WWB S.A.	
13	Colpatria S.A.	
14	Finamerica S.A.	
15	COMERCIACOOP.	
16	Banco Falabella.	
17	Giros y Finanzas.	
18	Banco Davivienda S.A.	
19	Bancamia S.A.	
20	Cooperativa Financiera de Antioquia.	
21	Mi Plata S.A.	
22	Microempresas de Colombia.	
23	Opportunity Internacional.	
24	Movilred.	
25	Baloto.	
26	Puntored/Conexred.	
27	Fullcarga.	
28	Carvajal.	
29	Copidrogas.	
30	Paga Todo para Todo.	
31	Pagafacil.	
32	Gane.	
33	Gana.	
34	4 -72.	
35	Servientrega.	
36	Otro. Cual?	

9. ¿Por qué decidió convertirse en corresponsal? ( múltiple respuesta)

1	Para obtener ingresos adicionales
2	Para atraer más gente a mi negocio.
3	Mis clientes esperaban que lo hiciera/me lo pidieron.
4	Quiero estar asociado con una gran compañía.

10. Si a partir de mañana dejará de ser corresponsal bancario, ¿cuáles serían los efectos sobre su negocio principal? ( única respuesta)

1	Alto efecto negativo en mi negocio principal.
2	Bajo efecto negativo en mi negocio principal.
3	No habría un efecto positivo o negativo en mi negocio principal.
4	Pequeño efecto positivo en mi negocio principal.
5	Gran efecto positivo en mi negocio principal.

11. Tras convertirse en corresponsal, ¿qué sucedió con la actividad en su establecimiento? ( única respuesta)

1	Aumentó.
2	Se mantuvo.
3	Disminuyó.
4	No sabe.

12. ¿Quién paga por el seguro del efectivo utilizado en el negocio de corresponsalía?. Si la respuesta es banco o red asociada pasar a la pregunta 13- ( única respuesta)

1	Banco.
2	Red.
3	El corresponsal.

12a. Si los pagos del seguro de efectivo los realiza el corresponsal ¿Cuánto paga usted mensualmente por seguros sobre el efectivo?, pasar a la pregunta 12b ( única respuesta)

1	1 a 30.000 pesos.
---	-------------------

2	30.001 a 60.000 pesos.
3	60.001 a 90.000 pesos.
4	Más de 90.000 pesos.

12b. De ese monto, ¿qué nivel de participación corresponde a gastos generados por el corresponsal bancario?( única respuesta)

1	0 a 20%.
2	21 a 40%.
3	41 a 60%.
4	61 a 80%.
5	81 a 100%.

13. ¿Cree que el ser un corresponsal bancario aumenta la probabilidad de ser víctima de robo? ( única respuesta)

1	Sí.
2	No.

14. ¿Alguna vez le ha sido víctima de hurto ? Si su respuesta es sí, pase a la pregunta 14a. De lo contrario, siga a la pregunta 15. ( única respuesta)

1	Sí.
2	No.

14a. ¿Cuándo fue la última vez que fue víctima de este delito? ( única respuesta)

1	Menos de tres meses
2	Entre 3 meses y 6 meses
3	Entre 6 meses y 9 meses
4	Entre 9 y 12 meses

14b. ¿Cuánto dinero perdió en aquella ocasión? ( única respuesta)

1	Menos de 20 mil pesos
2	Entre 20 mil y 100 mil pesos

3	Entre 100 mil pesos y 500 mil pesos
4	Más de 500 mil pesos

15. ¿Alguna vez sus empleados han robado dinero ? Si su respuesta es sí, pase a la pregunta 15a. De lo contrario, siga a la pregunta 16. ( única respuesta)

1	Sí.
2	No.

15a. ¿Cuándo fue la última vez que fue víctima de este delito? ( única respuesta)

1	Menos de tres meses
2	Entre 3 meses y 6 meses
3	Entre 6 meses y 9 meses
4	Entre 9 y 12 meses

15b. ¿Cuánto dinero perdió en aquella ocasión? ( única respuesta)

1	Menos de 20 mil pesos
2	Entre 20 mil y 100 mil pesos
3	Entre 100 mil pesos y 500 mil pesos
4	Más de 500 mil pesos

16. ¿Alguna vez sus clientes lo han robado engañadole en las operaciones de corresponsalía? Si su respuesta es sí, pase a la pregunta 16a. De lo contrario, siga a la pregunta 17. ( única respuesta)

1	Sí.
2	No.

16a. ¿Cuándo fue la última vez que fue víctima de este delito? ( única respuesta)

1	Menos de tres meses
2	Entre 3 meses y 6 meses
3	Entre 6 meses y 9 meses

4	Entre 9 y 12 meses
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16b. ¿Cuánto dinero perdió en aquella ocasión? (única respuesta)

1	Menos de 20 mil pesos
2	Entre 20 mil y 100 mil pesos
3	Entre 100 mil pesos y 500 mil pesos
4	Más de 500 mil pesos

17. ¿Cuál de los siguientes problemas observa en la operación de corresponsalia? Marque con una X los problemas que evidencia en las operaciones, puede seleccionar varias opciones de ser necesario. (selección múltiple)

1	Bajos volúmenes de operación.
2	Concentración en transacciones de retiros y pagos.
3	Inseguridad.
4	Pocos ingresos por las operaciones de corresponsalia.
5	Poco interés de los clientes por los productos bancarios.
6	Problemas con el acceso a Internet y las herramientas para transacciones.
7	Bajos cupos disponibles.
8	Oferta de servicios limitada, que no satisface las necesidades de los clientes.

18. ¿Ofrece servicios de retiros a cuentas bancarias en el corresponsal? Si es así responda la pregunta 18a, de lo contrario pase a la pregunta 19. (se podría hacer en check list y que habilite para cada una que ofrece el corresponsal, las preguntas de transacciones y comisiones)

1	Si.
2	No.

18a ¿Cuántas transacciones de este tipo ejecuta por día? (única respuesta)- (numérica)

1	1 a 5.
2	6 a 10.
3	11 a 15.
4	16 a 20.
5	Más de 20.



18b. ¿Cuál es la comisión pagada por el banco o la red (si aplica) para cada una de las operaciones de este tipo? (única respuesta)

1	100-150
2	150-200
3	200-300
4	300-400
5	Más de 400

19. ¿Ofrece servicios de retiros de programas sociales en el corresponsal? Si es así responda la pregunta 19a, de lo contrario pase a la pregunta 20. (única respuesta)

1	Si.
2	No.

19a. ¿Cuántas transacciones de este tipo ejecuta por día? (única respuesta)- (numérica)

1	1 a 5.
2	6 a 10.
3	11 a 15.
4	16 a 20.
5	Más de 20.

19b. ¿Cuál es la comisión pagada por el banco o la red (si aplica) para cada una de las operaciones de este tipo? (única respuesta)

1	100-150
2	150-200
3	200-300
4	300-400
5	Más de 400

20. ¿Ofrece servicios de desembolsos de crédito en el corresponsal? Si es así responda la pregunta 20a, de lo contrario pase a la pregunta 21. (única respuesta)

1	Sí.
2	No.

20a ¿Cuántas transacciones de este tipo ejecuta por día? (única respuesta)- (numérica)

1	1 a 5.
2	6 a 10.
3	11 a 15.
4	16 a 20.
5	Más de 20.

20b. ¿Cuál es la comisión pagada por el banco o la red (si aplica) para cada una de las operaciones de este tipo? (única respuesta)

1	100-150
2	150-200
3	200-300
4	300-400
5	Más de 400

21. ¿Ofrece servicios de consignación a cuenta bancaria en el corresponsal? Si es así responda la pregunta 21a, de lo contrario pase a la pregunta 22. (única respuesta)

1	Sí.
2	No.

21a ¿Cuántas transacciones de este tipo ejecuta por día? (única respuesta)- (numérica)

1	1 a 5.
2	6 a 10.
3	11 a 15.
4	16 a 20.
5	Más de 20.

21b. ¿Cuál es la comisión pagada por el banco o la red (si aplica) para cada una de las operaciones de este tipo? (única respuesta)

1	100-150
2	150-200
3	200-300
4	300-400
5	Más de 400

22. ¿Ofrece servicios de pago de obligaciones financieras en el corresponsal? Si es así responda la pregunta 22a, de lo contrario pase a la pregunta 23. (única respuesta)

1	Sí.
2	No.

22a ¿Cuántas transacciones de este tipo ejecuta por día? (única respuesta)- (numérica)

1	1 a 5.
2	6 a 10.
3	11 a 15.
4	16 a 20.
5	Más de 20.

22b. ¿Cuál es la comisión pagada por el banco o la red (si aplica) para cada una de las operaciones de este tipo? (única respuesta)

1	100-150
2	150-200
3	200-300
4	300-400
5	Más de 400

23. ¿Ofrece servicios de pago de servicios públicos en el corresponsal? Si es así responda la pregunta 23a, de lo contrario pase a la pregunta 24. (única respuesta)

1	Sí.
2	No.

23a ¿Cuántas transacciones de este tipo ejecuta por día? (única respuesta)- (numérica)

1	1 a 5.
2	6 a 10.
3	11 a 15.
4	16 a 20.
5	Más de 20.

23b. ¿Cuál es la comisión pagada por el banco o la red (si aplica) para cada una de las operaciones de este tipo? (única respuesta)

1	100-150
2	150-200
3	200-300
4	300-400
5	Más de 400

24. ¿Ofrece servicios de pago de impuestos en el corresponsal? Si es así responda la pregunta 24a, de lo contrario pase a la pregunta 25. (única respuesta)

1	Sí.
2	No.

24a ¿Cuántas transacciones de este tipo ejecuta por día? (única respuesta)- (numérica)

1	1 a 5.
2	6 a 10.
3	11 a 15.
4	16 a 20.
5	Más de 20.

24b. ¿Cuál es la comisión pagada por el banco o la red (si aplica) para cada una de las operaciones de este tipo? (única respuesta)

1	100-150
2	150-200
3	200-300
4	300-400
5	Más de 400

25. ¿Ofrece servicios de recargas de telefonía celular en el corresponsal? Si es así responda la pregunta 25a, de lo contrario pase a la pregunta 26. (única respuesta)

1	Sí.
2	No.

25a. ¿Cuántas transacciones de este tipo ejecuta por día? (única respuesta)- (numérica)

1	1 a 5.
2	6 a 10.
3	11 a 15.
4	16 a 20.
5	Más de 20.

25b. ¿Cuál es la comisión pagada por el banco o la red (si aplica) para cada una de las operaciones de este tipo? (única respuesta)

1	100-150
2	150-200
3	200-300
4	300-400
5	Más de 400

26. ¿Ofrece servicios de recargas para juegos de azar en el corresponsal? Si es así responda la pregunta 26a, de lo contrario pase a la pregunta 27. (única respuesta)

1	Sí.
2	No.

26a. ¿Cuántas transacciones de este tipo ejecuta por día? (única respuesta)- (numérica)

1	1 a 5.
2	6 a 10.
3	11 a 15.
4	16 a 20.
5	Más de 20.

26b. ¿Cuál es la comisión pagada por el banco o la red (si aplica) para cada una de las operaciones de este tipo? (única respuesta)

1	100-150
2	150-200
3	200-300
4	300-400
5	Más de 400

27. ¿Ofrece servicios de recarga de tarjetas de transporte público en el corresponsal? Si es así responda la pregunta 27a, de lo contrario pase a la pregunta 28. (única respuesta)

1	Sí.
2	No.

27a. ¿Cuántas transacciones de este tipo ejecuta por día? (única respuesta)- (numérica)

1	1 a 5.
2	6 a 10.
3	11 a 15.
4	16 a 20.
5	Más de 20.

27b. ¿Cuál es la comisión pagada por el banco o la red (si aplica) para cada una de las operaciones de este tipo? (única respuesta)

1	100-150
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2	150-200
3	200-300
4	300-400
5	Más de 400

28. ¿Ofrece servicios de recarga de servicios domésticos prepago (Internet, TV, telefonía fija) en el corresponsal? Si es así responda la pregunta 28a, de lo contrario pase a la pregunta 29. (única respuesta)

1	Si.
2	No.

28a. ¿Cuántas transacciones de este tipo ejecuta por día? (única respuesta)- (numérica)

1	1 a 5.
2	6 a 10.
3	11 a 15.
4	16 a 20.
5	Más de 20.

28b. ¿Cuál es la comisión pagada por el banco o la red (si aplica) para cada una de las operaciones de este tipo? (única respuesta)

1	100-150
2	150-200
3	200-300
4	300-400
5	Más de 400

29. ¿Ofrece servicios de venta de entradas para eventos, juegos y espectáculos en el corresponsal? Si es así responda la pregunta 29a, de lo contrario pase a la pregunta 30. (única respuesta)

1	Si.
2	No.

29a. ¿Cuántas transacciones de este tipo ejecuta por día? (única respuesta)- (numérica)

1	1 a 5.
2	6 a 10.
3	11 a 15.
4	16 a 20.
5	Más de 20.

29b. ¿Cuál es la comisión pagada por el banco o la red (si aplica) para cada una de las operaciones de este tipo? (única respuesta)

1	100-150
2	150-200
3	200-300
4	300-400
5	Más de 400

30. ¿Ofrece servicios de apertura de cuentas bancarias en el corresponsal? Si es así responda la pregunta 30a, de lo contrario pase a la pregunta 31. (única respuesta)

1	Sí.
2	No.

30a. ¿Cuántas transacciones de este tipo ejecuta por día? (única respuesta)- (numérica)

1	1 a 5.
2	6 a 10.
3	11 a 15.
4	16 a 20.
5	Más de 20.

30b. ¿Cuál es la comisión pagada por el banco o la red (si aplica) para cada una de las operaciones de este tipo? (única respuesta)

1	100-150
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2	150-200
3	200-300
4	300-400
5	Más de 400

31. ¿Ofrece servicios de consulta de saldo en el corresponsal? Si es así responda la pregunta 31a, de lo contrario pase a la pregunta 32. ( única respuesta)

1	Si.
2	No.

31a ¿Cuántas transacciones de este tipo ejecuta por día? ( única respuesta)- (numérica)

1	1 a 5.
2	6 a 10.
3	11 a 15.
4	16 a 20.
5	Más de 20.

31b. ¿Cuál es la comisión pagada por el banco o la red (si aplica) para cada una de las operaciones de este tipo? ( única respuesta)

1	100-150
2	150-200
3	200-300
4	300-400
5	Más de 400

32. ¿Ofrece servicios de emisión de extractos bancarios en el corresponsal? Si es así responda la pregunta 32a, de lo contrario pase a la pregunta 33. ( única respuesta)

1	Si.
2	No.

32a. ¿Cuántas transacciones de este tipo ejecuta por día? (única respuesta)- (numérica)

1	1 a 5.
2	6 a 10.
3	11 a 15.
4	16 a 20.
5	Más de 20.

32b. ¿Cuál es la comisión pagada por el banco o la red (si aplica) para cada una de las operaciones de este tipo? (única respuesta)

1	100-150
2	150-200
3	200-300
4	300-400
5	Más de 400

33. ¿Ofrece servicios de recepción de solicitudes de crédito en el corresponsal? Si es así responda la pregunta 33a, de lo contrario pase a la pregunta 34. (única respuesta)

1	Sí.
2	No.

33a. ¿Cuántas transacciones de este tipo ejecuta por día? (única respuesta)- (numérica)

1	1 a 5.
2	6 a 10.
3	11 a 15.
4	16 a 20.
5	Más de 20.

33b. ¿Cuál es la comisión pagada por el banco o la red (si aplica) para cada una de las operaciones de este tipo? (única respuesta)

1	100-150
2	150-200
3	200-300
4	300-400
5	Más de 400

34. ¿Ofrece servicios de transferencia de fondos en el corresponsal? Si es así responda la pregunta 34a, de lo contrario pase a la pregunta 35. (única respuesta)

1	Sí.
2	No.

34a. ¿Cuántas transacciones de este tipo ejecuta por día? (única respuesta)- (numérica)

1	1 a 5.
2	6 a 10.
3	11 a 15.
4	16 a 20.
5	Más de 20.

34b. ¿Cuál es la comisión pagada por el banco o la red (si aplica) para cada una de las operaciones de este tipo? (única respuesta)

1	100-150
2	150-200
3	200-300
4	300-400
5	Más de 400

35. ¿Ofrece servicios de recepción o envío de giros nacionales en el corresponsal? Si es así responda la pregunta 35a, de lo contrario pase a la pregunta 36. (única respuesta)

1	Sí.
2	No.

35a ¿Cuántas transacciones de este tipo ejecuta por día? (única respuesta)- (numérica)

1	1 a 5.
2	6 a 10.
3	11 a 15.
4	16 a 20.
5	Más de 20.

35b. ¿Cuál es la comisión pagada por el banco o la red (si aplica) para cada una de las operaciones de este tipo? (única respuesta)

1	100-150
2	150-200
3	200-300
4	300-400
5	Más de 400

36. ¿Ofrece servicios de compra y venta de divisas en el corresponsal? Si es así responda la pregunta 36a, de lo contrario pase a la pregunta 37. (única respuesta)

1	Sí.
2	No.

36a ¿Cuántas transacciones de este tipo ejecuta por día? (única respuesta)- (numérica)

1	1 a 5.
2	6 a 10.
3	11 a 15.
4	16 a 20.
5	Más de 20.

36b. ¿Cuál es la comisión pagada por el banco o la red (si aplica) para cada una de las operaciones de este tipo? (única respuesta)

1	100-150
2	150-200
3	200-300
4	300-400
5	Más de 400

37. ¿Cuánto paga mensualmente por arriendo de dispositivos de transacción? En caso de seleccionar la primera opción, siga a la pregunta 38. De lo contrario, responda la pregunta 37a. (única respuesta)

1	No paga por este concepto.
2	1 a 100.000 pesos.
3	100.001 a 200.000 pesos.
4	200.001 a 300.000 peoss.
5	Más de 300.000 pesos.
6	No sabe / no responde

37a. De ese monto, ¿qué nivel de participación corresponde a gastos generados por el corresponsal bancario?(única respuesta)

1	0 a 20%.
2	21 a 40%.
3	41 a 60%.
4	61 a 80%.
5	81 a 100%.
6	No sabe / no responde

38. ¿Cuánto paga mensualmente por su conexión primaria a Internet (ADSL, Cable, GPRS, 3G, conmutado, satelital, etc.)? En caso de seleccionar la primera opción, siga a la pregunta 39. De lo contrario, responda la pregunta 38a. (única respuesta)

1	No paga por este concepto.
2	1 a 100.000 pesos.
3	100.001 a 200.000 pesos.
4	200.001 a 300.000 peoss.
5	Más de 300.000 pesos.
6	No sabe / no responde

38a. De ese monto, ¿qué nivel de participación corresponde a gastos generados por el corresponsal bancario?( única respuesta)

1	0 a 20%.
2	21 a 40%.
3	41 a 60%.
4	61 a 80%.
5	81 a 100%.
6	No sabe / no responde

39. ¿Cuánto paga mensualmente por su conexión secundaria a Internet (ADSL, Cable, GPRS, 3G, conmutado, satelital, etc.)? En caso de seleccionar la primera opción, siga a la pregunta 40. De lo contrario, responda la pregunta 39a. ( única respuesta)

1	No paga por este concepto.
2	1 a 100.000 pesos.
3	100.001 a 200.000 pesos.
4	200.001 a 300.000 peoss.
5	Más de 300.000 pesos.
6	No sabe / no responde

39a. De ese monto, ¿qué nivel de participación corresponde a gastos generados por el corresponsal bancario?( única respuesta)

1	0 a 20%.
2	21 a 40%.
3	41 a 60%.
4	61 a 80%.
5	81 a 100%.
6	No sabe / no responde

40. ¿Cuánto paga mensualmente por transporte de efectivo? En caso de seleccionar la primera opción, siga a la pregunta 41. De lo contrario, responda la pregunta 41a. ( única respuesta)

1	No paga por este concepto.
2	1 a 100.000 pesos.

3	100.001 a 200.000 pesos.
4	200.001 a 300.000 peoss.
5	Más de 300.000 pesos.
6	No sabe / no responde

41a. De ese monto, ¿qué nivel de participación corresponde a gastos generados por el corresponsal bancario?( única respuesta)

1	0 a 20%.
2	21 a 40%.
3	41 a 60%.
4	61 a 80%.
5	81 a 100%.
6	No sabe / no responde

42. ¿Cuánto paga mensualmente por electricidad? En caso de seleccionar la primera opción, siga a la pregunta 43. De lo contrario, responda la pregunta 42a. ( única respuesta)

1	No paga por este concepto.
2	1 a 100.000 pesos.
3	100.001 a 200.000 pesos.
4	200.001 a 300.000 peoss.
5	Más de 300.000 pesos.
6	No sabe / no responde

42a. De ese monto, ¿qué nivel de participación corresponde a gastos generados por el corresponsal bancario?( única respuesta)

1	0 a 20%.
2	21 a 40%.
3	41 a 60%.
4	61 a 80%.
5	81 a 100%.
6	No sabe / no responde

43. ¿Cuánto paga mensualmente por salario de sus empleados? En caso de seleccionar la primera opción, siga a la pregunta 44. De lo contrario, responda la pregunta 43a. ( única respuesta)

1	No paga por este concepto.
2	1 a 100.000 pesos.
3	100.001 a 200.000 pesos.
4	200.001 a 300.000 peoss.
5	Más de 300.000 pesos.
6	No sabe / no responde

43a. De ese monto, ¿qué nivel de participación corresponde a gastos generados por el corresponsal bancario?( única respuesta)

1	0 a 20%.
2	21 a 40%.
3	41 a 60%.
4	61 a 80%.
5	81 a 100%.
6	No sabe / no responde

44. ¿Cuánto paga mensualmente de arriendo del local? En caso de seleccionar la primera opción, dé por finalizada la encuesta. De lo contrario, responda la pregunta 44a. ( única respuesta)

1	No paga por este concepto.
2	1 a 100.000 pesos.
3	100.001 a 200.000 pesos.
4	200.001 a 300.000 peoss.
5	Más de 300.000 pesos.
6	No sabe / no responde

44a. De ese monto, ¿qué nivel de participación corresponde a gastos generados por el corresponsal bancario?( única respuesta)

1	0 a 20%.
2	21 a 40%.
3	41 a 60%.
4	61 a 80%.
5	81 a 100%.
6	No sabe / no responde



## Appendix D: Descriptive Statistics of the Sample

Table D1

*Borough where the retailer is located*

Borough	Count
Engativá	61
Suba	41
San Cristóbal	40
Barrios Unidos	37
Bosa	34
Usme	29
Usaquén	20
Chapinero	7
Rafael Uribe Uribe	6
Kennedy	5
Teusaquillo	2
Total	282

Table D2

*Main economic activity of the retailer*

Type	Count
Mom-and-pop retail	68
Beauty/hair salon	20
Drugstore	20
Phone calls	18
Bakery	17
Stationer sellers	17
Internet café	15
Clothing store	12
Hardware store	11
Other	84
Total	282

Table D3

*Number of years in operation of the retailer*

Number of years in operation	Count
Less than a year	19
Between one and three years	73
Between three and five years	72
Between five and ten years	65
More than ten years	53
Total	282

Table D4

*Area of the retailer*

Area	Count
Less than 20 square metres	111
Between 21 and 50 square metres	98
Between 51 and 80 square metres	53
Between 81 and 100 square metres	15
Between 101 and 400 square metres	5
Total	282

Table D5

*Daily transaction volumes of the retailer*

Daily transaction volumes (amounts in Colombian pesos)	Count
Up to \$ 500.000	146
Between \$ 500.001 and \$ 1.000.000	91
Between \$ 1.000.001 and \$ 3.000.000	39
Between \$ 3.000.001 and \$ 5.000.000	6
Total	282

Table D6

*Borough where the banking correspondent is located*

Borough	Count
Barrios Unidos	22
Bosa	6
Chapinero	2
Engativá	36
Rafael Uribe Uribe	1
San Cristóbal	9
Suba	8
Teusaquillo	2
Usaquén	12
Usme	8
Total	106

Table D7

*Main economic activity of the banking correspondent*

Type	Count
Mom-and-pop retail	20
Phone calls	16
Internet café	14
Drugstore	11
Stationer sellers	7
Distributors	6
Others	32
Total	106

Table D8

*Opening year as a banking correspondent*

Opening year as a banking correspondent	Count
2006-2007	10
2008-2009	10
2010-2011	25
2012-2013	48
2014	13
Total	106

Table D9

*Distance from a banking branch*

Walking distance from a banking branch	Count
Unknown	4
Between 5 and 10 minutes	34
Between 11 and 15 minutes	31
Between 16 and 25 minutes	16
Between 26 and 35 minutes	14
More than 35 minutes	7
Total	106

Table D10

*Distance from another banking correspondent*

Walking distance from another banking correspondent	Count
Unknown	11
Between 5 and 10 minutes	20
Between 11 and 15 minutes	18
Between 16 and 25 minutes	35
Between 26 and 35 minutes	15
More than 35 minutes	7
Total	106

Table D11

*Reasons behind their opening as banking correspondents*

Reasons for becoming a banking correspondent	Count
Additional income	69
Attracting people to the retailer	30
My customers told/expected me to become one	5
Association with a large company	2
Total	106