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Methods and models for building bank branches. A Multicriteria approach for a decision-making tool

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Abstract. This work intends to study the latest trends in building branch systems, testing a mathematical model in the Italian banking sector at its current state of art. Particular attention is given to which is the relationship that links evolution, in terms of technology and needs, both of bank and customers, with physical spaces (branches).

The questions that will be possibly answered are: what is the value of a banking branch system and how building strategies can impact on it? How should they be located in the territory? What construction form should they take to adapt to the new needs?

A meta-design has been developed to identify the guidelines to be followed and the interventions to be taken in practice, by simulating a business case that, through the application of a multi criteria analysis, can be a reference for credit institutions. The developed methodology is then applied to a portion of the city of Milan, in order to practically experiment the feasibility and the outcomes.

1. Introduction

The digitalization of services and processes as well as the change in customers' needs are having a great impact on the physical distribution of stores and offices (Borkovskaya V.G, 2014) including also bank branches: in broad terms, bank branches are very much like any other retail channel (Ferreira et al., 2011).

These factors, along with the world financial crisis of 2008, are the main responsible of the need for a reorganization of the banks' branch structure and system. A system that, following several merging processes between different credit institutions, is now facing a situation in which the real estate asset inherited have become often redundant. After the expansion phase of the distribution network of the banks that characterized the sector until 2008, in the last years there has been a partial reduction of branches, correspondent 3,941 closures on the whole Italian territory in the period 2008-2015 (Ambrosio et al., 2016).

Through the analysis of the global trends and researching on the ideal way to redevelop a branch system, this work aims to provide a practical tool which can be implemented by medium-large sized banks to optimize their territorial presence.

This process will enable credit institutions not only to save significant amounts of money every year, but also to redesign the image of themselves which is transmitted to customers.

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The change in customers' profiles and needs is also an element to be considered when designing a strategy for the branches. With the progressive shift towards Millennials becoming the majority of the customers share, it is essential for banks to be able to address the right requirements.

The result is a newer way of intending banking, often less formal and closer to the final user. This involved shifting the focus from that of handling transactions towards providing more specialized, counselling and advisory services, which are communication intensive and require face-to-face interaction with customers (Camanho and Dyson, 2005).

As a matter of fact, no technology in the short or even medium term will be able to fully replace human interaction, which is still crucial for the most complex or delicate issues. This is also why the physical presence of banks on the territory, even in with the need of a significant cut, is still valuable and not yet obsolete.

2. The research problem

The research for a solution capable to tackle the aforementioned problems related to branch systems is set up as a business case aimed to emulate the situation that medium-large sized credit institutions are facing. The object is in fact a fictional Italian bank (Banca XYZ S.p.A.), which in terms of numerical and economic figures and dimension is evaluated as an average between the three main Italian groups (the top three by number of branches).

The purpose of the meta-design is to assess whether it is possible to rationalize and reorganize the structure of branches of Banca XYZ in its entirety, by identifying in the final value obtained the possible savings or losses resulting from the implementation of this complexity of interventions. This process is intended to represent a model applicable to all banks with characteristics similar to those of the fictitious Banca XYZ when they want to intervene on the state of affairs of their branch organization.

2.1 Theoretical foundations

Thanks to the analysis carried out, it has been possible to shape some general principles which should lead the way in the development of the process. The information gathered has been interpreted in order to be used to help in creating the guidelines of the transformation and will bring to what is called the Four-Branches model in the next sessions. What follows are the theoretical foundations behind the rethinking of the branches network:

Redesign of the branch network to reach the optimal balance between physical and digital presence. There are some statistics about the distribution of bank branches. For one of the most important Italian groups, for example, 25% of their retail points are located less than 500 meters one from each other. Similarly, in the US nearly 90% of people living in residential areas are in the reach of three or more banks (within about ten minutes). More significantly, 75% can choose between 6 or even more. The data shows a chance for credit groups to cut on costs. However, no one wants to be in the situation of "first mover disadvantage", where a massive closing down could be taken as a sign of weakness. Territorial presence still appears to be a reassuring element for many customers and ubiquity of branches matters when deciding whether to switch to another bank or not. With a model leveraging of four types of what can be the most successful branch formats it is possible to show how banks should adapt their network by being present with the right format in the right location to meet the need of well-defined users' requirements. Demographic studies are just an example of what can be done to properly reach the optimality.

Ease of customer's cross-channel experience. Banks are facing the challenge of adapting to the millennials life-style - constantly connected and able to get almost everything here and now. This segment is rapidly becoming a larger share of banks' customer, given that people born around the '90s are now in the age range of their first personal bank account. There is still a portion of customers though, belonging to all age groups but mostly to elderly people, which still value the experience of physically pay and store hard copy bills which can be written upon and monitored visually in the room. This represents a ritual for many customers accustomed to the traditional ways of banks and

post offices and it is not to be underestimated as it represents a behavioral need connected to sensations of tranquility given by a tangible translation of the operations which would otherwise result abstract and confused if entirely digital. The analysis of data from customers' feedbacks can help in defining the best form of customer-experience, even if it is too often neglected in the banking world.

Switch from transactions to interactions, with a focus on face-to-face relationships. It is now clear that the trend for transactions is the one of moving towards online banking and multimedia platforms. Banks have been trying to shift their branches away from routine transactions such as deposits, payments and cash withdrawals and into digital self-service channels instead (Du Toit et al., 2015). However, if and when customers decide to walk into a branch, they will expect to discuss important matters that they are not confident in leaving to the purely digital channel. The issues involved will probably be complex and it is essential that the branches are ready to accommodate such needs in a professional way. This is the reason why the skills required to the advisors in the agencies are now on another level, not only they should be able to solve technical problems, but they need to be empowered with tools which can help in understanding the customers deeply. This will enable employees to provide the right solutions at the right time, making it worth to the end users to have visited the branch, thus increasing his trust in the institution. The culture among the branch should be that of a retail shop and less that of a bare basic service.

Emotional engagement of customers through advanced marketing. Banks deal with people's money, this makes them related to all kind of feelings that money can generate, from the positive one to especially the worse ones. Building a clear and appealing offer is important in this sense to create in the clientele feelings of belonging to a cause or a lifestyle. Empowering a bank's brand can by itself make it appear stronger than others, just for the fact that many people know it and it is in the public eye.

2.2 The Four-Branches model

A key element of rationalization of branches becomes the identification and, where necessary, the development of alternative and innovative types of branch that can meet different target and market segments. The traditional banking network comprising homogenous, full-service branches

catering to customers across segments is no longer sustainable. Banks should consider a network made up of differentiated branches targeting specific customer segments (De Roys et al., 2013).

Such typologies must provide a more personalized and effective response to a demand that is characterized by a growing number and differentiation of needs. However, this is not the only reason why it is necessary and urgent to intervene on the operating, functional and distributive model of the branch: it is necessary to identify a solution, or rather a mix of solutions, that guarantee economic and functional efficiency for the bank itself, so that this can at least partly weaken the heavy burden that the branch system as a whole leads to, from an economic and organizational point of view.

In this new logic the whole service model will have to be rethought, in the equipment, in the physical structure / layout; its role will have to be redefined as well, necessarily different from the traditional one based solely on territorial coverage or transactional operativeness (Folcia and Penza, 2015).

The traditional banking network, consisting of a homogeneous and full-service branch organization that meets a demand from different customer segments, is no longer sustainable. Banks should consider a network made up of differentiated branches targeted at specific customer segments.

The aforementioned differentiation between branches can be identified by using two main indicators that, depending on how they are combined into a matrix, define and outline four main types of branches, which therefore have different characteristics aimed intercept different targets. These branches are the goal of rationalization, which, alongside a reduction in the overall number, foresees an intervention that redefines the type of logic and nature.

The indicators taken into account for identifying the main types of branch are:

- The complexity of the services offered, i.e. an indicator of the value-added services that are the ones for which customers still feel the need for direct contact with a specialized operator, due to the complexity of the service;
- The quality, efficiency and functionality of the branch space, which can be merely exhibit or be itself a further factor of prosperity and customer engagement).

It can be considered the "four branches model" as follow based on three logical categories: Keep, Close and Transform. Any logical category has different level of intervention.

3. Methodology

The research has been carried out considering 4 different methods, comparing results of any direct observation. It has been performed:

- A preliminary Analysis with the application of a Multicriteria analysis
- Sensitivity analysis
- The definition of four different types of branch style per-function delivered: Fast Food (simple and sales driven with a low number of services), Club Premium(High level of complexity in services and strong interaction with customers), Co-Branding (a mix of different functions: New Old (a large area for back office activities and a smaller are for customer interaction)

4. Results and Discussion

4.1 Preliminary Analysis

The core part of the methodology consists of the application of a multicriteria analysis (MCA) aimed to provide a decision-making tool useful in the process of branches' reorganization.

A preliminary analysis, preparatory to the application of the MCA, is needed in order to identify which branches, among the those of Banca XYZ, will have to be closed, transformed or kept as they are. It has been chosen, for testing the branches' distribution in the analytical process a portion of the city of Milan.

According to specific significant parameters is possible to make some considerations about the "destiny" of each branch considered. In particular, the aforementioned parameters are:

- Profitability: this item represents whether the branch is profitable or not, referred to the direct income generated within a year. This information is generally classified, but it is easily accessible by the management of the credit institution;
- Territorial presence in strategic locations: this item indicates whether the branch is located in a main street or square, near an underground stop or close to relevant urban benchmarks;
- Population: it represents what is the demographic trend over a time span of five years (2017-2023) in the various areas of the city in which the branches are located. It is considered as a positive indicator when the percentage increase is above the average value of 4,79%;
- Geographic overlapping: this item indicates whether there is another branch of the same bank in the range of 800m. When this happens, both branches are assigned the negative value;
- Serving a niche: if a branch serves a niche then it is located near particular districts within the city such as universities, central business districts, artisan shops, small business, etc.

To simplify the operating procedure, but at the same time to have a real area to experiment the method, the analysis has been restricted to one sector of the city of Milan, roughly the one corresponding to municipality 3, in the north-eastern area of the city. For the purpose of this research, it has been mapped the real current position of the branches of a specific bank.

Once considered all these pieces of information singularly, it is possible to draw a conclusion that takes into account the performance of each branch according to each parameter (or logical category: "keep", "close", "transform"): 27% of the current branches will be kept in the actual form, as their overall performance is satisfying and does not require immediate intervention. 28% of the existing branches in the area under analysis will be shut down - this number is also in line with the bank

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strategic position. However, a large number of the branches (45%) will require a transformation whose form will depend on the further analysis (multi criteria analysis) carried out below.

4.2 Multi Criteria Analysis

Multi-Criteria Analysis (MCA, for sake of simplicity also known as MCDA or MCDM) concerns the making of choices using multiple, and often conflicting, criteria, in efforts to arrive at pre-considered desired outcomes (Ward et al., 2016). MCDM techniques and approaches improve the quality of decisions by creating the development more efficient, rational and explicit (Mardani et al., 2015).

In order to come up to the decision of the most fitting typology for each "transform" branch, a multi criteria analysis appears to be the most suitable solution to evaluate the different transformation types (among the 4 branch types described before).

In addition to applying single MCDM methods to real world decisions, the progression of technology over the past couple of decades has allowed for more complex decision analysis methods to be developed (Velasquez and Hester, 2013). In fact MCA frameworks can be tailor-designed for particular agencies and stakeholders developed around particular problems, challenges and issues (Ward et al., 2016).

In our case the aim is to come up with a ranking that identifies, for each branch to be transformed, which of the four solutions is the most preferable with respect to the others. Is important to notice that the non-acting option (keep) and the closing option have already been taken into account in the preliminary analysis phase.

The fundamental step for a multi criteria analysis is the selection of a number of criteria along which is possible to measure the performance of the different options. The chosen criteria include:

- Increase in profitability;
- Increase in operating costs;
- Adaptability of the space to the intended destination;

For each typology it is assumed a ideal branch surface around: New old 200 sqm, Club premium 190 sqm, Co-Branding 330 sqm, Fast-Food 80 sqm

For this division is then considered the absolute value of the deviation with respect to 1. For example, the value related to the adaptability of the space of a given branch (with dimension 180 m2) to the "New Old" typology is the following:

$$A_{(New\ Old)} = \left| 1 - \frac{Real\ branch\ surface}{Ideal\ "New\ Old"\ surface} \right| = \left| 1 - \frac{180}{200} \right| = 0.1$$

4.2.1 Relevance between demographic projections and target population of the typology

The purpose of this criterion is to give a score to the different branch types applicable on the basis of the analysis of the demographic context of the district where the specific branch is located. Demographic analysis is based on the data provided by the municipality of Milan, that is, the projections of the number of inhabitants by age for each of the districts of the city. The 4 branch typologies have been designed to have different and sometimes complementary characteristics and attitudes so that it is possible to identify the degree of intensity with which each of them binds more or less with the different age ranges. The attribution of this intensity value is done by means of a Likert scale ranging from 1 to 9 (where 1 means that the age group is "absolutely not a target of the typology" and 9 means "being the absolute target of the typology"). This typology of scale has been introduced by Likert (1932), that developed a procedure for measuring attitudinal scales (Boone and Boone, 2012). The values assigned to each branch type are shown in the following table:

Age Tipology	0-18	19-40	41-60	61+
New Old	3	4	6	6
Club Premium	1	6	7	4
Co-Branding	3	9	5	2
Fast Food	5	8	4	3

Figure 1. Correlation intensity: age groups and branch typologies (elaborated by the authors)

The calculation is meant to weight, for each district, the percentage of population of each age group according to the values of the Table 3. For example, for what concerns Centrale district, the data about the age groups are the following (using Milano metropolitan area data):

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Age group Centrale data	0-18	19-40	41-60	61+	
People	2985	6097	6066	4587	
Percentage over the total	15,13%	30,89%	30,74%	23,24%	

Figure 2. Demographic data: example of Centrale district (elaborated by the authors)

So, the relevance indexes are calculated by summing up the products between the percentage (Table 4) and the values about the intensity of the targets (Table 3). In this case, with reference to the "New Old" typology we will have:

$$i(New Old) = (15,13\% * 3) + (30,89 * 4) + (30,74 * 6) + (23,24 * 4) = 4,99$$

4.2.2 Possibility to host employees in the back office

This criterion aims to consider the huge issue related to employees that banks are facing when they decide to reduce the number of branches. In fact, for each branch closed, there is a number of employees which must be (at least partially) relocated. In order to measure the extension of space available for this purpose, is necessary to distinguish between the front-office, i.e. the space meant to welcome the clients and to supply them services, and the back-office, i.e. the space meant to carry out office activities. The most immediate way to estimate the dimension of the space available for the back-office is by subtracting from the total surface of the real branch the area dedicated to the front-office. The extension of the front-office is estimated for each typology as a standard measure according to the specific characteristics, in particular: New Old with 100 sqm, Club Premium with 120 sqm, Co-Branding 70 sqm. Fast Food 50 sqm.

The criterion in this case is expressed as number of employees hostable in the back-office of each of the considered branches and for each of the different typologies. The calculation is made considering the following areas per headcount as a standard:

- Office (back-office): 9-11 sqm/HC;
- Branch (front-office): 25-30 sqm/HC.

The final calculation, concerning for example the number of employees hostable in Branch A according to the New Old typology is:

$$E_{A(New\ Old)} = \frac{Tot.surface - Front\ office}{Area\ per\ HC}$$

4.2.3 Brand awareness improvement

This criterion comes from the consideration that the branch will have in the future a fundamental role in the transmission of a sense of local "presence", reinforcing brand recognition and trust in it (Folcia and Penza, 2015). In order to estimate the values connected to the raise in brand awareness of the various options, it has been necessary to apply some techniques specific of the appraisal of non-market goods and, more specifically, the choice modelling method. Choice modelling is a family of survey-based methodologies for modelling preferences of goods, where goods are described in terms of their

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attributes and of the levels that these take. Respondents are presented with various alternative descriptions of a good, differentiated by their attributes and levels, and are asked to rank the various alternatives, to rate them or to choose their most preferred (Hanley et al., 2001). In this specific case the interviewees are asked to state in a questionnaire their preference by choosing the alternative they prefer by selecting on a scale from 0 to 10 a value indicating how much the 4 branch typologies are able to increase the bank brand awareness in their opinion.

In the summary of the results below are shown the data related to the number of preferences collected by each alternative (based on a number of respondents of 64): Co-Branding (average score 8,2; increase in brand awareness 82%), Club Premium (average score 6,8; increase in brand awareness 68%), New Old (average score 2,4; increase in brand awareness 24%), Fast Food (average score 1,9; increase in brand awareness 19%).

Once the criteria have been established, it is possible to evaluate how to transform the branches with outcome value "Transform" thanks to a multicriteria analysis featuring the criteria described above. In order to come up to the results is necessary to build up a series of performance matrixes – one for each branch that needs to be transformed – in which criteria (on the columns) and different solutions or branch typologies (on the rows) are combined. This type of matrixes is filled with the data coming from the different criteria.

The aim is to come up to a single final score, that takes into account all the different criteria, allowing to generate a ranking and compare the different solutions. In order to do this, it is necessary to translate all the data that fill the matrixes in a common unit of measurement, that is a relative scale ranging from 0 to 100, where the score 0 is attributed to the solution with the higher cost (or lower benefit), while 100 is attributed to the solution with the lower cost (or higher benefit), again according to a specific criterion. The equation to be applied to translate the values (v_c) depends on the nature of each criteria:

- If the criterion is a benefit $\frac{100}{|\max - \min|} |\min - v_c|$ - If the criterion is a cost $\frac{100}{|\max - \min|} |\max - v_c|$

Once the calculation is made for all the entries of the performance matrixes, we obtain a series of values all in the same unit of measure (the scale 0-100).

The final step is aimed at assigning to each criterion a specific weight that tells how important that specific criterion is according to the decision maker, as shown in the table below:



Figure 3. Initial weights distributions (Elaborated by authors)

A higher weight is assigned to the operating and organizational features: 25% of the total is assigned each to the change in operating costs, to the adaptability of the space (dimension) to the intended destination and to the possible number of hostable employees in the back-office. These criteria have a significant importance from an economic point of view and also in terms of the best possible use of the space available for organizational and efficiency-related purposes.

A lower weight is instead assigned to more marginal aspects, such as brand awareness improvement or the relevance of the demographic projections of each district to the target (in terms of age groups) of the different typologies. The criterion of change in profitability is characterized by a lower weight too because in this historical period there is a very small room for improvements in profitability for credit institutes, that in fact are focusing more on solutions for the reduction of costs. The summary of the results coming from the MCA is instead shown in the table below:



Figure 4. Summary of the results (elaborated by authors)

4.2.4 Sensitivity analysis

When a multi criteria analysis is used to choose between options, it is best practice to run a sensitivity analysis to assess how the change in the assignment of the weights affects the final results. The decision maker can make better decisions if he/she can determine how critical each criterion is. In other words, how sensitive the actual ranking of the alternatives is to changes on the current weights of the decision criteria (Triantaphyllou and Sánchez, 1997).

The variations on the most influential weights have been run in steps of 10% increases. This means that each of the three coefficients has been increased by 10% a time and the difference has been equally split among the remaining coefficients, as shown in the table below.

	Change in Profitability	Change in operating costs in respect to the traditional branch	Adaptability of the space to the intended destination	Relevance of demographic projections and target population of the typology	Number of hostable employees in the back office	Brand awareness improvement	Total weighted score
Sensitivity +10%	9,5%	27,5%	24,5%	9,5%	24,5%	4,5%	100,0%
Sensitivity +20%	9,0%	30,0%	24,0%	9,0%	24,0%	4,0%	100,0%
Sensitivity +30%	8,5%	32,5%	23,5%	8,5%	23,5%	3,5%	100,0%

Figure 5. Variation of weights for the sensitivity analysis (Elaborated by authors)

The results of the sensitivity analysis are the following:

- With a 10% increase on the weight for the criteria "Change in operating costs in respect to the traditional branch", there have been no changes in the final results of distribution of the different typologies;
- With a 10% increase on the weight for the criteria "Adaptability of the space to the intended destination", there have been no changes in the final results of distribution of the different typologies;
- With a 10% increase on the weight for the criteria "Number of hostable employees in the back office", there have been no changes in the final results of distribution of the different typologies;
- With a 20% increase on the weight for the criteria "Change in operating costs in respect to the traditional branch", the typology Co-Branding becomes a Fast Food type;
- With a 20% increase on the weight for the criteria "Adaptability of the space to the intended destination", there have been no changes in the final results of distribution of the different typologies;
- With a 20% increase on the weight for the criteria "Number of hostable employees in the back office", there have been no changes in the final results of distribution of the different typologies;
- With a 30% increase on the weight for the criteria "Change in operating costs in respect to the traditional branch", the typology Co-Branding becomes a Fast Food type and the same happens for the Club Premium;
- With a 30% increase on the weight for the criteria "Adaptability of the space to the intended destination", the Club Premium typology becomes a Fast Food;

• With a 30% increase on the weight for the criteria "Number of hostable employees in the back office", one of the New Old type becomes a Fast Food.

5. Conclusions

The results of the process described can be easily visible by looking at the transformation of the branch distribution in the considered area:



Figure 6. The final situation in the area after the intervention. Source: Author's elaboration

Of the eight branches to be transformed, two are converted in the "Fast Food" typology, four become a "New Old" type, one a "Club Premium" and the remaining one is converted in the most innovative of the typologies; the "Co-Branding";

The final results bring to two further aspects: Yearly savings and Square metres freed from branches.

In fact, the process explained previously lead to a variation in the operating costs and also to a reduction into rent costs.

According to the different typologies to be implemented resulting from the MCA is possible to estimate the annual savings in terms of operating costs, considering the following values: Front-office:65 euro sqm/year; Back-office:55 euro Sqm/year.

The complete estimation of the overall savings coming from the changes in the operating amounts to \in 53.118,00 per year.

It is also possible to estimate the savings in terms of rental costs. A remarkable part of the branches is going to be closed as a consequence of the considerations made during the analysis. This estimate is made by gathering the data about the rent cost, that indicate different prices for different districts of the city. The savings for the reduction in the overall rent costs are calculated as the difference between the total rent before transformation (per year) and the total rent after transformation (per year). In the case in which the owner of the space is the bank itself, the rent cost can be considered, from the point of view of the credit institute, as the missed income deriving from the rent of the space to third parties.

The complete estimation of the overall savings coming from the rent costs reduction is shown in the Appendix 3 and amounts to \in 186.709,56 per year.

The final result shows that the cumulative overall saving, taking into account the 18 branches analysed within a part of the city of Milan, is of about € 239.827,56 per year.

The overall process, and so the result, could be repeated for any medium-large sized bank willing to reorganize its branch distributive and typological structure.

6. Discussion

Fairly soon the bank as we know it today will no longer exist, but it will undergo a profound process of transformation. There will be new services and new modalities of access to the accounts. Branches will change layout, furnishings and mission, and will become less and less tied to the territory by turning into traveling bodies. New payment systems will be introduced, while the most well-known and most widely used ones will gradually disappear. Experiments have already begun in Italy and are ongoing around the world.

The proximity-oriented approach, with a massive number of branches spread across the territory, will be fading. As a result, we will witness to the emergence of the opposite phenomenon, namely the creation of temporary solutions embedded in contexts of high visibility and attendance, such as shopping malls, but also near cafés and bars.

Obviously, it will not be possible to rely solely on these innovative itinerant solutions, but there will be a complete rethinking of the branches active in the territory, which in fact will change skin, becoming real financial and dialogue-oriented advisory centres with a large space designed and dedicated for refreshment and relaxation areas.

These needs have led the traditional branch to become obsolete, but today, by streamlining and modernizing branches to offer better service, reduce costs and improve the customer experience (Brunier et al., 2016), there's the opportunity to implement a structured and profound plan of rethinking for the branches system, as they represent a considerable expenditure item in the balance sheets of credit institutions and are the consequence of the uncontrolled explosion in terms of number up to the years pre-crisis.

In this context, the analytical decision-making tool developed in this work allows to analyse a set of parameters, data and indicators so as to identify, among a number of pre-selected branches, which of these must undergo a transformation process, close or stay almost inadequate.

Therefore, this is an instrument that any credit institution can use to revise its own policies and internal choices related to branches and also, the methodological approach can be adopted and merged with other academic situations and topics (Borkovskaya V.G. et al. 2018), (Borkovskaya V.G. et al., 2018 (2)).

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