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Innovation and proximity: The case of start-ups in the Casablanca-Settat region of Morocco

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Abstract. Numerous studies have focused on the relationship between proximity - mainly geographical - and business innovation in a given territory (Chesbrough, 2003; Laursen & Salter, 2006; Mongo, 2013). The objective of our research is to study the link between the proximity of all forms and start-ups' level of innovation in the Casablanca-Settat region of Morocco by applying structural equation modelling (PLS-SEM) using the Smart PLS 3.3.9 software. Moreover, a structural model is proposed that can be used to assess the level of innovation in organizations based on their internal capacities (human, financial, and technical capital) and the logic of proximity established within their local and global environment. To verify our hypotheses, the proposed model is tested on a sample of 98 Moroccan start-ups, relying on the mixed methodology of the hypothetico-

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deductive approach. The results indicate a positive correlation (26%) between proximity and the level of innovation of Moroccan start-ups. Moreover, proximity logic remains an important determinant of start-ups' innovation in addition to internal capacities.

Keywords: proximity, innovation, internal capabilities, Moroccan start-ups, PLS-SEM approach.

JEL Classification: C5, R1

1. INTRODUCTION

For more than three decades, some studies have focused on the link between proximity - essentially geographical proximity - and business innovation in a given area (Chesbrough, 2003; Laursen & Salter, 2006; Mongo, 2013). While several theoretical debates remain, the work carried out by the Dynamiques de Proximité research group has led to a consensus on at least one point: geographical proximity is not everything. Firstly, geographical proximity does not necessarily translate into cooperation and interaction (Torre, 2014). Secondly, the existence of cooperation between distant firms shows that interaction and cooperation can be based on non-geographical proximity (Torre & Rallet, 2005; Rychen & Zimmermann, 2008; Torre, 2008; Lethiais, 2018).

Thus, the agglomeration of companies in a particularly dense geographical area (geographical proximity) no longer appears to be an essential condition for cooperation and innovation. On the contrary, differences between territories and companies in terms of innovation persist, which raises the issue of other types of proximity and accessibility to resources, and not just in terms of the location of these resources (Mccann, 2007; Shearmur, 2011). Therefore, it remains to be seen whether the establishment of various types of proximity (e.g., organizational, institutional, relational, cognitive, electronic, etc.) between start-ups (or SMEs) in a given territory would be a determining factor in their capacity to develop products and/or services and to innovate.

The primary goal of this research is to develop a structural model for assessing the level of innovation in organizations based on their internal capacities (human, financial, and technical capital) and their proximity logic established within their local and global environment. In other words, we want to see if the activation of several types of interactions or relationships (organizational, social, cognitive, electronic, etc.) between the actors (the start-ups in our sample) can promote the development of innovation and increase its level in this type of company. This paper will, therefore, present our study of the link between proximity - in all its forms - and the level of innovation in nascent organizations (start-ups) in the Casablanca-Settat region of Morocco.

Our objective is not to analyze the extent to which the logics of proximity make it possible to establish links and relationships of inter-actor cooperation within the framework of territorial configurations (networks of actors), such as a cluster or a competitiveness center, because this has already been understood (in particular the relationships of cooperation which involve the sharing of information or skills between the actors involved, and customer-supplier relationships). However, we are seeking to gain a better understanding of the extent to which the logic of proximity-activated by start-ups in the Casablanca-Settat region can encourage the innovation process within this type of organization in the process of being launched.

With this in mind, our work aims to answer the following two questions: do the internal capacities of companies have an impact on their level of innovation; do the proximities activated by start-ups in the Casablanca-Settat region have an impact on their capacity to cooperate and collaborate? And consequently,

do they have an impact on their level of innovation? To test our hypotheses, the proposed model examined a sample of 98 Moroccan start-ups, relying on a mixed methodology hypothetico-deductive approach, applying structural equation modeling (PLS-SEM) using Smart PLS 3.3.9 software.

This research focuses on Moroccan start-ups (a specific type of SME) operating in the fields of industry, new technologies, and services. Firstly, they are often described as organizations for which external cooperation is paramount (Bjerke & Johansson, 2015; Ebersberger & Herstad, 2013) and are always seeking to develop close relationships. Secondly, start-ups, or SMEs in general, are considered to be locally rooted (Freel, 2003), which raises questions about their ability to mobilize resources outside the local or even regional sphere. The questions raised are therefore particularly relevant in the case of this population of companies.

The first part of this paper sets out the theoretical framework that has informed all the research we have carried out and sets out the hypotheses we have tested. The second part presents the data used and the methodology employed. The third part sets out the results obtained and discusses them to highlight the contribution of this synthesis. Finally, the conclusion summarises the main findings and suggests some future research directions.

2. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

2.1. Innovation: A complex combination of several factors

Entrepreneurship is about creating new businesses or revitalizing existing ones through the design of an innovative Business Model (BM) to respond to market opportunities (Chabaud & Sammut, 2014). The European Commission states that "Entrepreneurship is a mindset and a process for creating and developing an economic activity by blending risk-taking, creativity, and innovation with sound managerial skills in a new or existing business" (Green Paper Entrepreneurship in Europe, 2003).

According to Steve Blank and Bob Dorf (2013), a startup is "a temporary organization in search of a BM that is industrialisable, profitable and allows for growth", and represents "a human institution used to create a new product or service under conditions of extreme uncertainty" (Ries, 2011). Uncertainty is one of the reasons why it is organized on a very low hierarchical level (Calori & Reynood, 1986) and why it is under pressure to implement tools to validate its "Minimum Viable Product" as soon as possible[1] (Rancic Moogk, 2012).

Throughout the innovation process, players are faced with several questions about the outcome: will the market accept the products designed? Will the research efforts lead to new ideas? Are the prototypes obtained feasible with current production resources? (Aulet B, 2018).

In a start-up, the entrepreneur has to test all the hypotheses before finalizing the BM. The creation of a company is a sum of hypotheses to be tested as much as possible until the BM evolves and develops (Jungerman, 2014). For this reason, the literature proposes a method of managing innovation in startups, or what is known as Effectuation. The latter is a managerial approach developed in the 1990s by Saras Sarasvathy. This approach stipulates that the starting point of the project is the entrepreneur, with his or her personality, knowledge, relationships, and financing capabilities constituting his or her basic resources (Sarasvathy, 2001). With these, the entrepreneur determines what he can do (the means determine the possible goals). If all goes well, the action leads to the involvement of new stakeholders, who in turn bring

[1] The MVP is the smallest unit that can be tested by potential users and the least elaborate, for example, a mock-up or a prototype. The MVP is intended to be tested as quickly as possible so that its effects can be measured and data collected.

new resources to the project. These new resources enable the entrepreneur to define new, more ambitious goals, and to return to the starting point: new resources, new goals, which mean new actions, and new stakeholders, which mean additional resources, etc. With this approach, the opportunity is built up over time rather than being discovered in a flash of genius.

A start-up's key resources represent the means necessary for the smooth running of the business. These resources depend, among other things, on the type and area of activity of the organization. Resources can take the form of financial, tangible, and intangible resources. In their book, the authors stress that for creative and innovation-intensive industries, human resources play a crucial role in the success of entrepreneurial activity. Key resources can be seen as the capabilities and inputs that an organization needs to deliver its value proposition to its customers. They refer to the tangible and intangible resources needed to meet customer expectations (Osterwalder et al. 2011).

According to Blank S. Dorf B. (2020), a start-up is "a temporary organization in search of a BM that is industrialized, profitable and allows for growth", and represents "a human institution used to create a new product or service in conditions of extreme uncertainty". Uncertainty is one of the reasons why it is organized on a very low hierarchical level, and why it is under pressure to put tools in place to validate its "Minimum Viable Product" as quickly as possible.

From these statements, we can say that the success of startups in terms of innovation depends essentially on the resources (tangible and intangible) adopted from the launch of the organization, which requires the careful choice of these resources effectively and efficiently: a competent human resource, cost-effective production equipment and a sustainable source of finance. The following assumptions can therefore be made: The internal capabilities of start-ups, embodied in human, financial, and technical resources, will have a positive impact on their level of innovation (H1); Human capital will have a positive effect on the internal capabilities of start-up organizations (H2); Funding will have a positive effect on the internal capabilities of the start-up organization (H3).

2.2. Proximity: A lever for innovation

In recent years, proximity has been the subject of increasing interest from the point of view of its potential effects on innovation and economic development. Numerous studies (Tremblay et al., 2003) have highlighted the importance of spatial proximity and its impact on the development and success of innovation in start-ups.

The term proximity, in the Marshallian perspective, referred to the concentration of organizations in a limited territory. The main measure of this proximity is the distance between them. Spatial proximity refers to the hypothesis that the greater the number of local players, the greater the possibility of cooperation in solving problems, and that the denser the local exchange relationships, the faster they accelerate the process of creating and developing innovative projects (Saives, 2000).

In terms of the typology of proximity, there is a great debate between the "tri-type" approaches and the five-type approaches. But generally speaking, the different approaches can be considered complementary or even substitutable from our point of view, given the similarities they show. For this reason, we will try to present the types of proximity existing in the literature to broaden the analysis, while discriminating between "tri-type" and "five-type" proximities.

Tri-type" proximity encompasses geographical, organizational, and institutional proximity. Geographical proximity is defined as "the distance in kilometers between two entities (individuals, organizations, towns) weighted by the temporal and monetary cost of crossing it". This proximity is therefore spatial and has two properties: firstly, it is binary (determines whether one is near or far), and

secondly, it is doubly relative (about a set of criteria such as subjectivity and means of transport (Torre and Caron, 2002).

Organized proximity, which is essentially relational, unlike the first, is "of a different nature: it results from a social link" (Rallet, 2002). As a result, it goes beyond the physical framework of the territory to focus on the social links between players. Organized proximity "reflects the respective positioning of agents in terms of their potential for coordination". Two entities (individuals or organizations) can be considered close "if they share values, rely on identical coordination rules, share a precise knowledge base, speak the same language, regularly exchange e-mails, etc." (Pecqueur & Zimmermann, 2004).

On the other hand, institutional proximity "reflects the fact that a group of individuals shares and conform to the same set of institutions". So, as long as institutions exert a certain influence on individuals, it is obvious that these institutions exert the same influence, if not more, on organizations and territorial configurations. In an increasingly uncertain global and local context, institutions intervene to reduce this uncertainty by providing the necessary and accurate information and analysis to ensure the success of any collective or individual action. The institutional sphere, then, acts as "structures that provide a framework for behavior, particularly collective behavior, and are thus the foundation of social relationships and therefore of a form of proximity" (Talbot, 2008). In this way, the institutional sphere constitutes an important support and a dimension of proximity.

In terms of the "five-type" approach, and according to the logic of similarity, organizations and individuals can resemble each other in terms of knowledge, and this resemblance or similarity creates a kind of cognitive proximity. The latter "refers to the degree of similarity in the knowledge bases of organizations (...) this is a crucial issue for communicating and transferring knowledge. Effective knowledge transfer and collaboration requires the ability to identify, interpret and exploit new knowledge" (Boschma, 2005; Grossetti, 2008). Cognitive proximity refers to the idea of "a similarity or complementarity of values, "self-evident facts", projects, routines, conventions, referents, etc. (all things that can be grouped under the term "cognitive resources"). In this logic, cognitive proximity is presented as "the capacity of actors to learn from others" (Dupuy, Burmeister, 2003). This means that when individuals, organizations, or players in a given territory share the same knowledge or expertise, they are close cognitively, and can therefore interact and form cooperative and coordinative relationships regardless of the physical distance separating them.

Social proximity also emphasizes "the role of social relationships, based on trust, friendship and family relationships between individuals". So, in terms of creating interdependencies, this proximity is based on personal or family ties, developed over time or in the environment of the family and acquaintances. In terms of interactions and coordination (between agents and individuals), it involves the micro-economic level.

There is also relational proximity and "mediation resource" proximity, which refers to proximity via mediation tools. This distinction comes down to the fact that inter-actor interactions can take place using two methods: the first direct and without any means of mediation, and the second indirect or with mediation. As far as relational proximity is concerned, interactions take place in networks between players in a direct way; in fact, this proximity is defined by "the position of the different players in the networks". Mediation resource proximity is based on "devices that enable exchange without mobilizing relational chains", therefore, at the level of this type, exchanges or interrelations cannot exist without the existence of mediation or means that facilitate the relationship between the players, bearing in mind that mediation resources can be material or immaterial.

There is another type of proximity that is widely used and studied in the field of technology or innovation, and that is "electronic" proximity, which makes it possible to overcome geographical or physical constraints. This proximity is based almost entirely on the same logic of similarity already mentioned, so organizations and companies that have the same technologies or a similar level of innovation have a good

chance of coordinating and collaborating on collective projects. We are talking here about the activation of electronic or technological proximity.

The activation of proximity will thus give rise to different forms of relationships in space, and particularly to different types of relationships and collaboration between firms, whether within clusters or with partners located at a distance. Proximity would therefore encourage the establishment of market and non-market relationships between actors who are geographically or organizationally close, and it would also help to make these relationships effective, by facilitating face-to-face meetings or indirect links (Boschma, 2005), which encourages cooperation, collaboration between actors, the transfer of tacit knowledge, and therefore the emergence of innovations (Oerlemans & Meeus, 2005).

This inter-actor cooperation, triggered by proximity, is often seen as a factor that encourages innovation within organizations (start-ups in our case) and in a given territory, as shown by the open innovation practices that tend to spread (Chesbrough, 2003). The positive impact of cooperation on firms' ability to innovate has been regularly highlighted (Bjerke & Johansson, 2015; Toigo, 2017).

Based on the innovation practices of industrial firms in the UK, it has been shown that the most outward-looking firms are also the most innovative and the most likely to cooperate with universities (Laursen & Salter, 2006). Also, based on a comparative analysis of the determinants of innovation in services and industry, it has been shown that customer/supplier partnerships and the local level of cooperation have a positive influence on the deployment of non-technological innovations, particularly within service companies (Mongo, 2013). Also, in a sample of SMEs located in the North of Great Britain, it has been shown that cooperation with customers has a positive impact on product innovation and cooperation with suppliers and universities on process innovation (Freel, 2003).

Two hypotheses could therefore be subtracted: governance or the organization of players in a given territory will have a positive effect on the level of proximity between players (H4), and proximity will have a positive effect on the level of innovation of organizations in the process of launching (start-ups) (H5).

2.3. Develop hypotheses

After outlining the different approaches that have served as a basis for researchers to identify the relationship between proximity in the broad sense and the level of innovation of companies, it, therefore, seems necessary at this stage to choose the appropriate variables to study and, above all, to determine an analytical framework that will allow us to put our research into context. Two key lessons can be drawn from the literature reviewed in the previous sections. Firstly, the multitude of types of proximity and innovation, as well as the effects of the different types of proximity which can be activated by the organization on the latter's overall level of innovation. This justifies the choice of setting up a model adapted to the Moroccan context and appropriate research devices to test the link between the variables studied.

Given that we propose to test the effect of different types of proximity on the overall level of innovation of Moroccan companies, particularly start-ups in the Casablanca-Settat region of Morocco. Five hypotheses will be necessary to define this direct link. These hypotheses are developed by several empirical studies, which establish the link between the organization's internal capabilities (human, financial, and technical resources) and the level of innovation on the one hand (Sarasvathy, 2001; Osterwalder et al. 2011; Blank and Dorf, 2020). On the other hand, work links proximity and innovation (Chesbrough, 2003; Toigo, 2017; Laursen & Salter, 2006; Mongo, 2013; Freel, 2003). These elements lead us to justify the existing links between the logic of proximity-activated by Moroccan start-ups and their overall level of innovation.

For our research, we formulate the following hypotheses:

H1: The internal capabilities of start-ups, in the form of human, financial, and technical resources, will have a positive impact on their level of innovation

H2: Human capital will have a positive effect on the internal capacity of organizations in the process of launching

H3: The funding will have a positive effect on the organisation's internal capacity at the start-up stage

H4: The governance or organization of stakeholders in a given area will have a positive effect on the level of proximity between stakeholders

H5: Proximity will have a positive effect on the level of innovation of organizations in the process of launching themselves (start-ups)

These hypotheses enable us to summarise the various links we wish to study and thus generate the conceptual and hypothetical model for our research. In what follows, we will set out an appropriate research model for testing our hypotheses, as well as the methodology to be implemented.

3. RESEARCH METHODOLOGY AND TOOLS

3.1. Search model

The development of the theoretical context made it possible to define the various concepts to which the many recent empirical studies cited in this research referred. Thus, the causal link model that we have retained for this research is composed of the organization's internal capacities (human, financial, and technical resources) the logic of proximity activated by the organization as explanatory variables, and the organization's overall level of innovation as the variable to be explained. Based on the various elements presented above, the conceptual research model can be presented as follows:

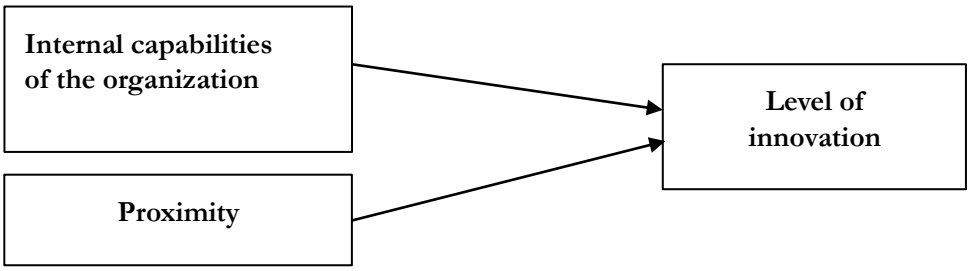

Figure 1. Simplified conceptual model of our study

Source: Personal design

A simplified model based on which we develop the hypothetical model of the research by specifying the hypotheses we are going to test (each relationship between two constructs is a hypothesis).

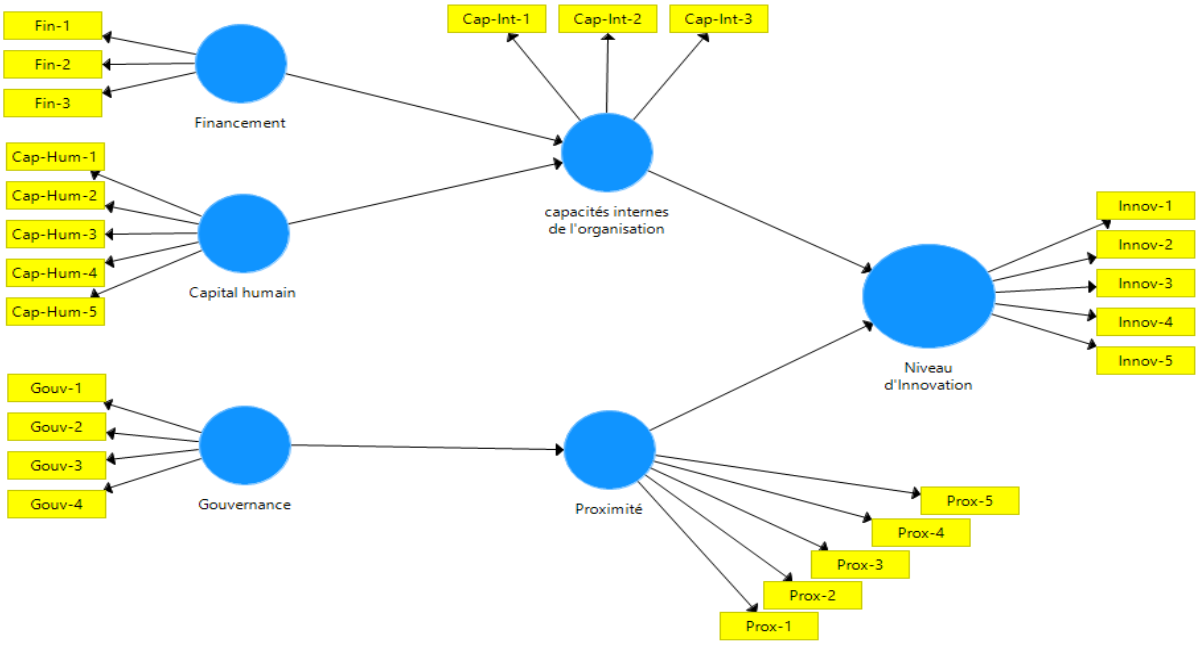

Figure 2. Hypothetical model for our research

Source: Personal design using Smart PLS.

Having explained our theoretical framework and presented our hypotheses, we now turn to the methodological aspects adopted in our study. In what follows, we will explain the research design used in this survey, present the sample, and the measures used to evaluate each of the variables that make up our research model.

3.2. Field study: Duration, description, and sample

This study was carried out by a team of four researchers: Sara Ousghir, Mohamed Zahidi, Hajar Makry et Ayoub Kassimi. This team carried out the work, from literature review and development of methodological tools to data collection, processing, and interpretation of results. The study took place over 18 months, from June 2022 to December 2023. During this period, field surveys throughout the Casablanca-Settat region of Morocco and data analysis were carried out.

For our research, we have used a mixed methodological approach, combining the qualitative approach (data collection using a questionnaire and semi-structured interviews) and the quantitative approach (data processing based on structural equation modeling using Smart PLS, version 3.3.9), because we are testing an existing theory that has been studied by several researchers, such as Boschma in 2004, Massard Torre and Crevoisier in 2004, Depret and Hamdouch in 2009, Khattabi and Maillefert in 2013, Sánchez-García, Martínez-Falcó, Marco-Lajara, and Pizoń in 2023, etc. All these studies have confirmed the existence of a positive link between proximity (geographic or cognitive) and the level of innovation. So, in terms of our research, we're trying to explore this link in a different context, with different actors (notably start-ups) and with different tools (statistical modeling).

We have therefore opted for a positivist stance, based on a deductive approach that prioritizes explanation, considering that our role is to "discover the simple reasons why observed facts are linked to the causes that explain them" (Lapalle, 2012). The hypothetico-deductive method on which we base our study will also enable us to test the hypotheses set out in the previous section using quantitative tools. To

collect the necessary data, our questionnaire included questions to assess the perceptions of start-ups in the Casablanca-Settat region regarding their internal capabilities and the proximity logics they activate on a local, national, or international scale, about their overall level of innovation.

The study is based on empirical data collected from a large sample of start-up companies in the Casablanca-Settat region of Morocco, from a variety of business sectors (Information and Communication Technology, E-commerce, Agritech, Renewable Energy and Environment, Transport and Logistics, etc.). The parent population is made up of a large number of start-ups operating in various sectors. In 2023, over 48% of the region's start-ups are active in sectors such as commerce, technology, fintech, and e-commerce. The region is dominated by numerous technology start-ups, notably in the fields of omnichannel solutions, human resource management via cloud platforms, as well as fintech and circular economy initiatives. Casablanca remains the leading city in terms of start-up concentration, accounting for almost 78% of active companies in the region. Start-ups in Casablanca-Settat are also distinguished by the variety of their business models, ranging from online service platforms to innovative companies in the field of sustainable development and social inclusion (start-up.ma).

Given the large number of start-ups in the study region and the diversity of their business sectors, which makes it difficult to survey all start-ups, we used the sampling technique to determine a representative sample. Data were therefore collected from 98 start-ups in the region, working in the various sectors of the parent population to ensure representativeness, through self-administration of a questionnaire developed by the authors of this research.

To calculate the sample size, G*power 3.1530 software was used, with the following parameters (Gefen et al., 2011): F2= 0.15 (mean); α = 5%; number of predictors = 5; power was set at 80%. The necessary sample size set by the software, to test our model is 92, (as shown in the following figure). This is a higher threshold than that suggested by Hair et al. (2010), demonstrating the high representativeness of our sample.

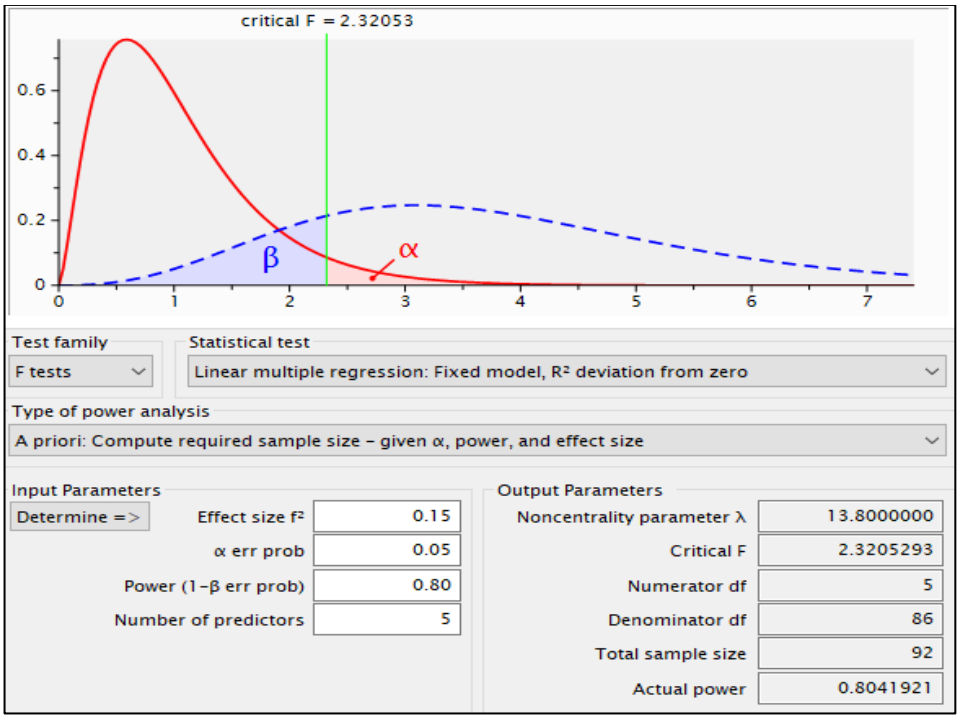

Figure 3. Determining the research sample size

Source: Our development (G* Power 3.1)

The characteristics of the start-ups in our sample in the Casablanca-Settat region are shown in the following table:

Table 1

Characteristics of start-ups in the sample

The business sector of start-ups surveyed	**Number of observations**	**Frequency**
Information and communication technology	11	11,22
E-commerce	14	14,29
Agritech	5	5,10
Renewable energy and environment	9	9,18
Health and MedTech	4	4,08
Education and EdTech	6	6,12
Tourism and Hospitality	9	9,18
Transport and logistics	8	8,16
Social entrepreneurship	17	17,35
Blockchain and Cryptocurrencies	8	8,16
Real estate (PropTech)	7	7,14
Total	**98**	**100**

Source: Our development (survey data)

3.3. Questionnaire design and measurement variables

To collect the data, we carried out a field survey using a variety of tools, including observations, semi-structured interviews, and a questionnaire. The aim was to analyze in depth the link between the level of innovation, proximity logic, and the internal capabilities of start-ups in the Casablanca-Settat region of Morocco.

With this in mind, and with a view to ensuring relevance and efficiency, this design is based on dividing the questionnaire into several parts: the first part is devoted to general information about the respondents (activity, sales, type of player, experience, legal status, etc.). The second part is devoted to assessing or measuring the level of innovation of the start-ups in the study, based on several variables, notably internal capabilities (technical, human, and financial) and proximity logic, using closed questions.

To measure our variables, we opted for a Likert-type interval scale divided into five intervals: 1 "Strongly disagree"; 2 "Somewhat agree"; 3 "Somewhat agree"; 4 "Agree"; 5 "Strongly agree". This type of scale has several advantages: it can convey more information than other scales, categorize the characteristics of the variables studied, and perform fairly sophisticated statistical analyses. The Likert scale also overcomes the statistical limitations of other types of scales, such as ordinary or nominal scales (Haccon and Cousineau, 2007).

In terms of measuring the constructs of our structural model, the organization's internal capabilities were examined using two independent variables: financial resources or financing of the organization, and human capital. These two variables were examined using 8 items or measurement scales based on different dimensions (questionnaire questions): availability of financial resources, allocation of resources, availability of human resources, qualification of human resources, etc. Proximity as an important variable (based on another variable, governance or the organization of players) was examined using 5 items and measurement scales linked to the types of proximity activated; the level of proximity, the importance of cognitive proximity, etc. for both the overall level of innovation and the level of human capital. Both for the overall level of innovation, which was examined using 5 items and measurement scales related to the innovation process, innovation in management, innovation in products and services, number of patents and trademarks,

etc., and for the level of human capital, which was examined using 5 items and measurement scales related to the level of human capital.

In the third part of the questionnaire (in the form of an interview guide), we proposed open-ended questions to identify the constraints of the innovation process in start-ups on the one hand and to propose some recommendations on the other.

To validate the questionnaire, we carried out two types of analysis. An exploratory factorial analysis using SPSS (V.25) to reduce the variables to a few factors that explain a significant percentage of the original variance. This is done by retaining only those items saturating 0.30 on a factor with a representation quality greater than or equal to 0.2 (Tabachnick & Fidell, 2007). The Bartlett test must be significant with a KMO (Kaiser-Meyer-Olkin) index greater than 0.7. Factors are postulated to be correlated since they explain the same phenomenon or construct. Oblimin rotation and extraction methods (as this is not a principal component analysis) were used. After this initial analysis, we were able to validate all model variables. We also carried out a confirmatory factor analysis (CFA) to assess the validity of the structural model's constructs. Through this second analysis, we were able to validate the measurement instruments. In this research, we carried out a confirmatory factor analysis of the model constructs (using LISREL software) before testing the model as a whole on Smart PLS, with the aim of purifying items displaying excessive measurement errors.

Relying on our constructed model (via Smart-PLS) and using our questionnaire administered to the start-ups in the sample, we were able to calculate the percentage of variance explained by the five variables or constructs in the model. In fact, following the analysis, the percentage of variance explained or R2 is 0.966, which shows that the model variables (financing, human capital, governance, internal capabilities, proximity) can explain up to 96% of the level of innovation in the start-ups in the study. This will be fully explained in the next section (results and discussion).

In terms of methodological experience, it can be argued that the initial theoretical concept proved somewhat difficult to apply in the empirical setting, necessitating methodological revisions to align research objectives with field reality. Thus, at the outset, the questionnaires were somewhat complex, which discouraged respondents, but we subsequently tried to simplify them to facilitate understanding and completion. This improved the response rate from start-ups. The tools used, such as the questionnaire, data processing software, or statistical models, proved their effectiveness in gathering and analyzing the necessary information. They enabled smooth data collection and robust analysis. The teams involved were able to coordinate tasks efficiently, enabling deadlines to be met and resources to be managed optimally.

4. EMPIRICAL RESULTS AND DISCUSSION

To analyze the search model, we employed the partial least squares (PLS) technique using Smart PLS 3.3.9 software (Ringle, blende & Becker, 2015). Following the two-step analytical procedures recommended by Anderson and Gerbing (1988), we first test the measurement model (validity and reliability of the measurements), subsequently, we examine the structural model (test of the hypothesized relationship) (Hair et al., 2017; Ramayah et al., 2016; Ramayah et al., 2017). In addition, to test the significance of the path and loading coefficients, a bootstrapping method (5000 resamples) was used (Hair et al., 2017).

4.1. Analysis of the measurement model

To assess the measurement model, two types of validity were examined. First, convergent validity, and second, discriminant validity.

Convergent Validity analysis

The measure of convergent validity is typically verified by examining loadings, average variance extracted (AVE), and also composite reliability (Gholami et al., 2013; Rahman et al., 2015). The loadings were all above 0.715, the composite reliabilities were all above 0.7 and the AVE of all constructs was also above 0.5 as suggested in the literature (Hair et al., 2017). In the following table, we present the convergent validity results of our model.

Table 2

Convergent validity analysis

Built	Indicators	Cross Loading (CL)	Cronbach	RhoA	CR	AVE
Financing	Fin-1	0,952	0,930	0,940	0,955	0,877
	Fin-2	0,921				
	Fin-3	0,936				
Human capital	Cap-Hum-1	0,854	0,889	1.056	0,896	0,635
	Cap-Hum -2	0,781				
	Cap-Hum -3	0,794				
	Cap-Hum -4	0,833				
	Cap-Hum -5	0,715				
Governance	Gov-1	0,984	0,978	0,980	0,983	0,937
	Gov -2	0,938				
	Gov -3	0,980				
	Gov -4	0,969				
Internal capabilities of the organization	Cap-Inter-1	0,959	0,929	0,934	0,955	0,877
	Cap-Inter -2	0,936				
	Cap-Inter -3	0,913				
Proximity	Prox-1	0,980	0,962	0,966	0,971	0,871
	Prox -2	0,939				
	Prox -3	0,975				
	Prox -4	0,920				
	Prox -5	0,846				
Level of innovation	Innov-1	0,969	0,945	0,951	0,958	0,821
	Innov -2	0,910				
	Innov -3	0,872				
	Innov -4	0,939				
	Innov-5	0.835				

Source: Our development using Smart-PLS.

According to the table, the composite reliabilities are all greater than 0.7, so high levels of reliability and internal consistency have been demonstrated at the level of all the constructs in the model. In addition, there were no major differences between the Alpha Cronbach and composite reliability values, which justifies the reliability of the internal consistency of the variables. The AVE values for all constructs were also above the acceptable threshold of 0.5. This confirms the convergent validity of our model. Thus, all the CRs are greater than the AVEs (CR > AVE).

Discriminant validity (DV) analysis

The purpose of this indicator is to show that the constructs or variables in the model are independent of each other. There are two ways to verify the independence of constructs; the observation of cross-indicator loadings with higher factor loadings in their respective variables than in the others (Chin, 1998a), and the criterion of Fornell and Larcker, which suggests that the square root of the AVE of each latent variable can be used to establish discriminant validity, if this value is greater than the other correlation values between constructs (Wong, 2013). The following table presents the results of discriminant validity.

Table 3

Analysis of the Fornell-Larcker criterion to check discriminant validity

	1	2	3	4	5	6
1. Human capital	0.797					
2. Financing	0.382	0.936				
3. Governance	0.391	0.370	0.968			
4. Level of Innovation	0.709	0.582	0.324	0.979		
5. Proximity	0.697	0.597	0.336	0.948	0.937	
6. Internal capabilities of the organization	0.702	0.595	0.360	0.906	0.933	0.936

Source: Our development using Smart-PLS.

Analysis of the discriminant validity table clearly shows that the factor loadings in the original constructs (latent variables) are always greater than the others. In principle, this means that the model has discriminant validity based on the criteria of Chin (1998a), but when the criterion of Fornell and Larcker is used, it can be noted that the model can be improved to guarantee DV. This shows that each variable is highly correlated with itself. A similar observation is also made for the other latent variables. We can argue that there is no interdependence between the different variables in the model, and therefore discriminant validity is well established.

4.2. Assessment of the structural model

To evaluate the structural model, it is suggested to examine the R2, the path coefficients, and the corresponding (t) and (p) values via a Bootstrapping procedure with a resample of 5,000 (Hair et al., 2017). They also suggested that in addition to these basic measures, researchers should also report predictive relevance (Q2), as well as effect sizes (f2) (Sullivan & Feinn, 2012), While a (p) value may inform the reader of the existence of an effect, it does not reveal the size of the effect. For this reason, substantial significance (effect size - f^2) and statistical significance (p-value) are essential results to highlight.

Testing the suitability of the model

Before testing the model, we first tested the model fit using three model fit parameters. The first is the Standardized Roof Mean Square Residual (SRMR) which signifies the difference between the observed correlation and the model's implied correlation matrix, with values below 0.08 (Hu & Bentler, 1998) considered a good fit. Henseler et al (2014). The second is the Normed Fit Index (NFI), which represents an incremental fit measure that calculates the chi-square value of the proposed model and compares it to a significant benchmark (Bentler & Bonett,1980). NFI values tending towards 0.9 generally represent a good model fit. The third is the exact model fit, which tests the statistical inference (based on bootstrapping) of the divergence between the empirical covariance matrix and the covariance matrix implied by the composite factor model.

For the case of our structural model, the SRMR value is 0.033 (< 0.08), the NFI is 0.839 (> 0.80), and the values d_ULS < Hl bootstrapped 95% of d_ULS and d_G < Hl bootstrapped 95% of d_G. These results indicate that the data fit our structural model well.

Checking the meaning of structural paths in bootstrapping

Using a procedure called 'Bootstrap', Smart PLS can generate T-statistics for significance testing of the internal and external model. Using this option, a large number of sub-samples (5000 in our case) are taken from the original sample with replacement to give Bootstrap standard errors, which in turn give approximate (t) values for the structural path significance test. The Bootstrap result is used to approximate the normality of the data. The following figure shows the results of the Bootstrap approach, applied to our structural model.

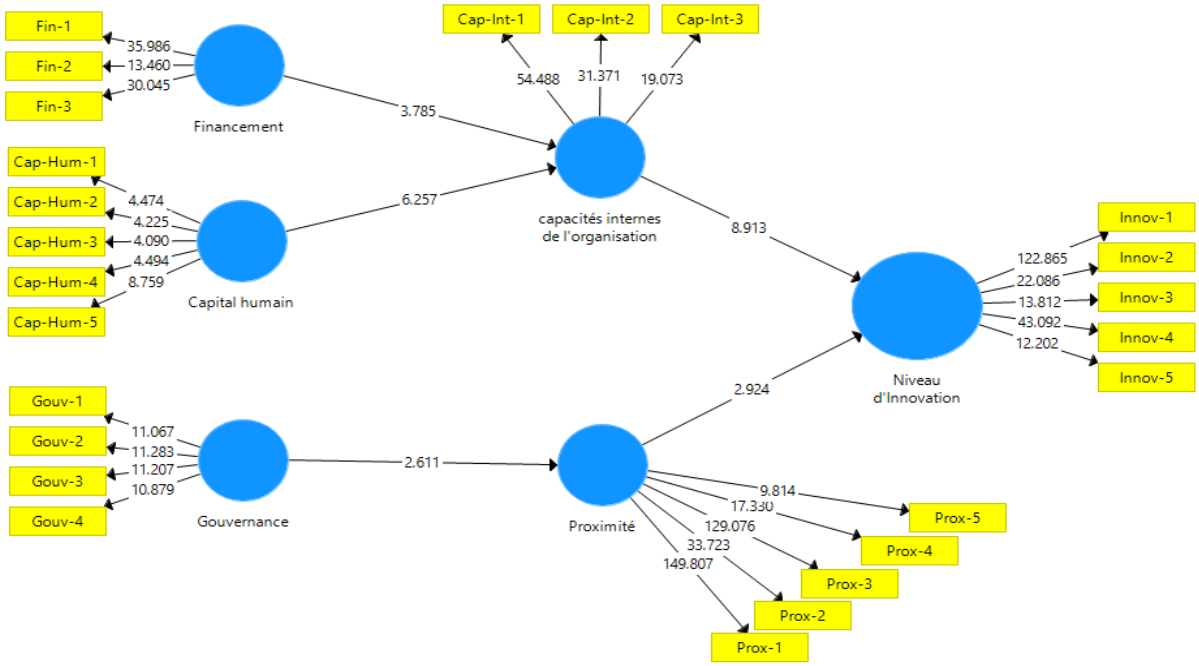

Figure 4. Bootstrapping results for the structural model

Source: Personal design using Smart PLS

Having examined the path coefficients for our internal model, we can explore the external model by checking the (t) statistic. These are the path coefficients or values on the lines that link the variables in the model. This indicator must be greater than 1.96 for the relationship to be significant. In our case, the previous figure shows in detail the structural model, the values of the indicators attached to each variable, and the path coefficients for all the relationships in the model. Also, all the loadings of the different constructs of the structural model are highly significant (p tends towards 0). From the bootstrapping results, we note that all the relationships meet the significance condition (> 1.96).

Results of hypothesis testing

At this level, we analyze in depth the validity of our research hypotheses on the basis of the significant results of the different relationships forming our structural model, aimed at evaluating the impact of the

organization's internal capabilities and the logic of proximity on the level of innovation of organizations (start-ups). Consequently, our structural model illustrates five hypotheses that we intend to test, relying on (P) and (T) values and confidence intervals.

The following table shows the results of the tests of the hypotheses of our structural model, built through the use of the Bootstrapping approach, based on the illustrative model discussed previously. Confirmation or invalidation of the structural model hypotheses is based on the use of the (p) criterion.

Table 4

Results of hypothesis testing for the structural model

H	Relationship	Std. Beta	Std. error	t-value	p-value*	Decision	2.5%	97.5%	R2	F2
1	Cap Hum -- Cap Inter	**0.556**	0.089	6.257	0.000	Supported	0.414	0.791	0.618	0.690
2	Fin - Cap Inter	**0.383**	0.101	3.785	0.000	Supported	0.135	0.553		0.328
3	Gov -- Prox	**0.336**	0.129	2.611	0.009	Supported	0.078	0.590	0.113	0.127
4	Prox -- Innov	**0.255**	0.087	2.924	0.004	Supported	0.055	0.408		0.232
5	Cap Inter-- Innov	**0.740**	0.083	8.913	0.000	Supported	0.591	0.927	0.966	1.956

Significant codes: (*) Significance about alpha (5%). Green means that the hypothesis is significant and therefore accepted.
Source: own calculations in Smart PLS

Based on the results of our hypothesis testing, we can say that the five hypotheses of our structural model are valid. Of the five hypotheses of our structural model. Firstly, human capital has a positive impact on the organization's internal capabilities of over 55% (H2), which reflects the importance of human resources and their qualifications for the organization in terms of the innovation process. Next, funding has a positive effect on the organization's internal capabilities of over 38% (H3). This makes financial resources the second main factor in developing the innovative capabilities of Moroccan organizations, provided they are available and well-managed. Next, the governance or internal and external organization of the organizations has a positive effect on the logic of bringing these organizations closer to their environment (territory, private players, public players, training establishments, national/international research laboratories, etc.) to the tune of 37% (H4).

As expected, the internal capabilities of the organizations (human, technical, financial, organizational, etc.) have a very significant positive impact on the level of innovation of the start-ups studied, at over 74% (H1). Finally, the proximity logic activated by the start-ups surveyed had a positive effect on their level of innovation of 26% (H5). This means that the organization's openness to its environment and the activation of links with various external players (local, private, public, community, etc.), especially those operating in the cognitive field of research and development, through the establishment of direct and indirect cognitive relationships with innovation centers, universities, research laboratories, training establishments, etc., encourage these organizations' capacity for innovation. Indeed, it can be said that proximity encourages innovation.

The results of the hypothesis testing in this study thus support the importance of proximity in the broad sense in terms of the development of innovation logic and mechanisms within Moroccan companies, especially those in the process of launching, supported by internal capacities (financial, human, and technical). These results are in line with numerous research studies that have demonstrated the importance of considering an organization's proximity to its local and international environment as a very important lever for the development of an organization's (private or public) innovative capacities.

A company's proximity to logistics zones, training centers, research laboratories, support institutions, and even competitors, etc., encourages the development of a spirit and capacity for innovation.

The coefficient of determination (R2) assesses the ability of the explanatory variables to explain the dependent variable, indicating the quality of the adjusted model. The R2 must be greater than 10% to accept the relationship (Falk & Miller, 1992). In our case, it is important for the following relationships: Cap Hum -- Cap Inter, Fin - Cap Inter, Prox - Innov, Cap Inter-Innov. And now for the Gouv - Prox relationship.

The following figure presents our structural model by specifying the coefficient of determination for all the relationships (research hypotheses) linking the different constructs of the model. All the hypothesized relationships are significant and express a large coefficient of determination (R2), as shown below.

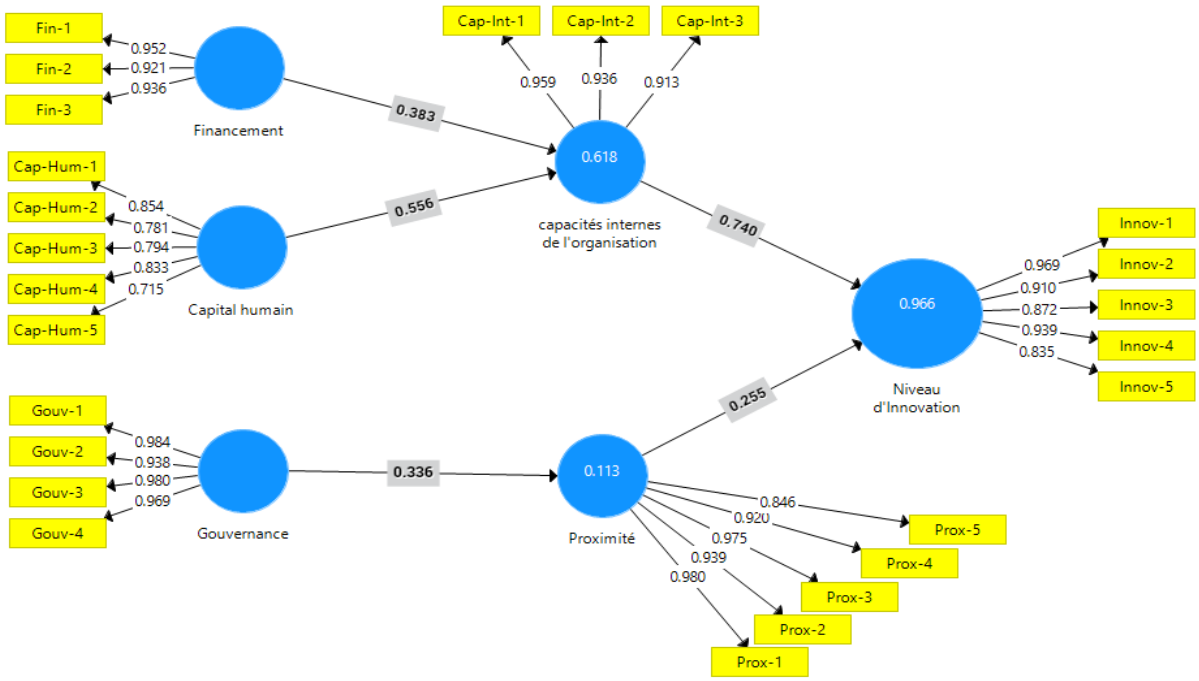

Figure 5. Coefficients of determination for the different relationships in the structural model

Source: Personal design using Smart PLS

Also, the test of the strength of the relationship between the variables (F2) shows the extent to which an exogenous latent variable contributes to the R^2 value of an endogenous latent variable. In another way, the effect size (F2) assesses the magnitude or strength of the relationship between the latent variables. Because, in addition to the importance of indicating whether or not the relationship between the variables is significant via the R2 (the ability of the explanatory variables to predict the dependent variable), it is very important to assess the size of the effect or the strength of the relationship between the variables in the model.

In this sense, Cohen (1996) suggested that an effect size of 0.02 to 0.15 is considered weak, between 0.15 and 0.35 is considered medium, above 0.35 is considered strong, while below 0.02 it is insignificant (Ringle, blende & Becker, 2015). From this point on, all the relationships in our model have significant strength except the Gouv - Prox relationship, which shows some weakness (0.127).

CONCLUSION

In this article, we present the results of empirical research into the role of the different logics of proximity (the different forms of proximity) on the level of innovation -period 2022-2023-, focusing on a particular population of companies, namely start-ups in the Casablanca-Settat region of Morocco operating in the fields of industry, new technology, and services,

Our contribution was twofold. Firstly, we tried to develop a structural model for assessing the level of innovation of start-ups by relying on the evaluation of their internal capacities (human, financial, and technical resources) and the proximities activated by these companies. We then analyzed the impact of the forms of proximity-activated by start-ups on their capacity for innovation, using structural equation modeling with Smart-PLS version 3.3.9.

The results of this research provided empirical confirmation of a number of theories, particularly those put forward by the Dynamiques de Proximités group, and enabled us to establish a link between the various research studies on the role of proximity in cooperative relationships and, consequently, in companies' capacity for innovation.

The results of this research show the activation of several forms of proximity between start-ups in the Casablanca-Settat region, over and above purely geographical proximity, including organizational, social, and cognitive proximity. The results also empirically validate the role of different types of proximity on the innovation capacity of the start-ups surveyed. They highlight the importance of all forms of interaction in inter-firm relations and, more specifically, in cooperation for innovation in the context of start-ups. Companies, and start-ups in particular, can interact with other players, regardless of their geographical location, by activating cooperative links that enable them to develop their innovative capabilities.

This work could be pursued in a direction that involves investigating the innovation behavior of start-ups more precisely, by specifying the different possible forms of innovation, in order to subsequently study the correlations that exist between the forms of innovation and the types of proximity, in order to know exactly which type of proximity determines which innovation behavior?

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