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Emidio Gressler Teixeira

BUILDING ORDINARY CAPABILITIES FOR AGTECH PERFORMANCE: THE ROLE OF KNOWLEDGE ECOSYSTEMS IN BRAZIL AND FRANCE

Porto Alegre, Brazil
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Advisor (Université de Rennes): Dr. Dominique Philippe Martin.

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Approved on November 15th, 2023:

Kadigia Faccin, *PhD.*
Unisinos
(Advisor)

Dominique P. Martin, *PhD*.
Université de Rennes
(Advisor)

Diego A. B. Marconatto, *PhD*.
Fundação Dom Cabral
(Co-advisor)

Laura S. da Rosa, *PhD*.
Université de Rennes
(Co-advisor)

Gilnei Luiz de Moura, *PhD*.
Universidade Federal de Santa Maria
(Reporter)

Pascal Paillé*, PhD.*
NEOMA Business School
(Reporter)

Bibiana V. Martins, *PhD*.
Unisinos
(Examiner)

Nabil Khelil*, PhD.*
Université de Caen
(Examiner)

Olivier Coussi, *PhD*.
Université de Potiers
(Examiner)

Porto Alegre, Brazil
2023

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ABSTRACT

BUILDING ORDINARY CAPABILITIES FOR AGTECH PERFORMANCE: THE ROLE OF KNOWLEDGE ECOSYSTEMS IN BRAZIL AND FRANCE

Author: Emidio Gressler Teixeira
Advisor (Unisinos): Dr. Kadigia Faccin
Advisor (Université de Rennes): Dr. Dominique P. Martin

Knowledge ecosystems are collaborative environments that bring together universities and research centers (URCs) and new technology-based firms (NTBFs) to develop innovations in a pre-competitive setting. URCs act as seedbeds for NTBFs by providing essential knowledge and resources. Due to their limited resources, NTBFs often need to establish knowledge flows with URCs to complement their resource base and ensure growth. Despite the significance of URC knowledge transfer for NTBFs, it is still unclear how URCs support the development of ordinary capabilities in these firms through various knowledge transfer processes and how these capabilities affect business performance. To address this gap, this study focuses on agtechs, a specific type of NTBF that provides innovative technologies and solutions in the agribusiness and food sectors. This research examines how different knowledge transfer mechanisms assist agtechs in building the ordinary capabilities they require and how these resources are configured to improve firm performance. The study analyzes NTBFs from Brazil and France, two significant players in the agribusiness industry, with different institutional environments that can influence knowledge transfer and entrepreneurial activities. Based on a sample of 48 agtechs from Brazil and 52 from France, the study’ results contribute to the literature in two ways. Firstly, it demonstrates that URC knowledge transfer cannot be considered a homogeneous entity, as it takes place through multiple knowledge channels, each producing different outcomes at the firm level. Despite agtechs in both Brazil and France relying less on URC knowledge than initially anticipated, two knowledge transfer channels proved to be effective for agtechs in Brazil, while five were effective in France. Secondly, the research identified various combinations of capabilities that improve NTBF performance in both countries, underlining different growth strategies. The study's results highlight the significance of the interplay between capabilities, as no ordinary capability alone can lead to higher levels of performance. By identifying the most effective knowledge transfer channels and the combinations of ordinary capabilities that lead to superior performance, this study provides valuable insights for the Resource-Based View (RBV) and the Knowledge Spillover Theory (KST).

Keywords: Agtech; Ordinary Capabilities; Performance; Knowledge Ecosystem; Knowledge Transfer Channels; University and Research Centers.

RESUMO

CAPACIDADES ORDINÁRIAS PARA O DESEMPENHO DAS AGTECHS: O PAPEL DOS ECOSSISTEMAS DE CONHECIMENTO NO BRASIL E NA FRANÇA

Autor: Emidio Gressler Teixeira
Orientadora (Unisinos): Dra. Kadigia Faccin
Orientador (Université de Rennes): Dr. Dominique P. Martin

Ecossistemas de conhecimento são ambientes colaborativos que reúnem universidades e centros de pesquisa (UCPs) e empresas nascentes de base tecnológica (ENBTs) para desenvolver inovações em um ambiente pré-competitivo. As UCPs atuam como viveiros de ENBTs, fornecendo conhecimento e recursos essenciais. Devido aos seus recursos limitados, as ENBTs muitas vezes precisam estabelecer fluxos de conhecimento com as UCPs para complementar sua base de recursos e garantir o crescimento do negócio. Apesar da importância da transferência de conhecimento das UCPs para as ENBTs, ainda não está claro como as UCPs apoiam o desenvolvimento de capacidades ordinárias nessas empresas por meio de vários processos de transferência de conhecimento e como essas capacidades afetam o desempenho do negócio. Para abordar essa lacuna, este estudo se concentra em agtechs, um tipo específico de ENBT que oferece tecnologias e soluções inovadoras nos setores de agronegócio e alimentação. Esta pesquisa examina como diferentes mecanismos de transferência de conhecimento ajudam as agtechs a desenvolver as capacidades ordinárias que elas precisam e como esses recursos são configurados para melhorar o desempenho das empresas. O estudo analisa ENBTs do Brasil e da França, dois importantes atores na indústria do agronegócio, com diferentes ambientes institucionais que podem influenciar a transferência de conhecimento e atividades empreendedoras. Com base em uma amostra de 48 agtechs do Brasil e 52 da França, o estudo contribui para a literatura de duas maneiras. Em primeiro lugar, demonstra que a transferência de conhecimento das UCPs não pode ser considerada uma entidade homogênea, pois ocorre por meio de múltiplos canais de conhecimento, cada um produzindo resultados diferentes no nível da empresa. Apesar das agtechs no Brasil e na França utilizarem menos do conhecimento das UCPs do que o inicialmente previsto, dois canais de transferência de conhecimento se mostraram eficazes para as agtechs no Brasil, enquanto cinco foram eficazes na França. Em segundo lugar, a pesquisa identificou várias combinações de capacidades que melhoram o desempenho das ENBTs em ambos os países, destacando diferentes estratégias de crescimento. Os resultados do estudo mostram a importância da interação entre as capacidades, pois nenhuma capacidade ordinária sozinha pode levar a níveis mais elevados de desempenho. Ao identificar os canais de transferência de conhecimento mais eficazes e as combinações de capacidades ordinárias que levam a um desempenho superior, este estudo fornece insights valiosos para a Resource-Based View (RBV) e a Knowledge Spillover Theory (KST).

Palavras-chave: Agtech; Capacidades Ordinárias; Desempenho; Ecossistema de Conhecimento; Canais de Transferência de Conhecimento; Universidades e Centros de Pesquisa.

RÉSUMÉ

CAPACITÉS ORDINAIRES POUR LA PERFORMANCE AGTECH : LE RÔLE DES ÉCOSYSTÈMES DE CONNAISSANCE AU BRÉSIL ET EN FRANCE

Auteur: Emidio Gressler Teixeira
Directrice de Thèse (Unisinos): Dr. Kadigia Faccin
Directeur de Thèse (Université de Rennes): Dr. Dominique P. Martin

Les écosystèmes de connaissances sont des environnements collaboratifs qui rassemblent les universités et les centres de recherche (UCR) ainsi que les nouvelles entreprises à base de technologies (NEBT) pour développer des innovations dans un cadre précompétitif. Les UCR agissent comme des pépinières pour les NEBT en fournissant des connaissances et des ressources essentielles. En raison de leurs ressources limitées, les NEBT ont souvent besoin d'établir des flux de connaissances avec les UCR pour compléter leur base de ressources et assurer leur croissance. Malgré l'importance du transfert de connaissances des UCR pour les NEBT, il reste encore flou comment les UCR soutiennent le développement de compétences ordinaires dans ces entreprises à travers différents processus de transfert de connaissances et comment ces compétences affectent la performance de l'entreprise. Pour combler cette lacune, cette étude se concentre sur les agtechs, un type spécifique de NEBT qui propose des technologies et des solutions innovantes dans les secteurs de l'agroalimentaire et de l'alimentation. Cette recherche examine comment différents mécanismes de transfert de connaissances aident les agtechs à développer les compétences ordinaires dont elles ont besoin et comment ces ressources sont configurées pour améliorer la performance de l'entreprise. L'étude analyse les NEBF du Brésil et de la France, deux acteurs importants de l'industrie agroalimentaire, avec des environnements institutionnels différents qui peuvent influencer le transfert de connaissances et les activités entrepreneuriales. Basée sur un échantillon de 48 agtechs du Brésil et de 52 de France, l'étude contribue à la littérature de deux manières. Tout d'abord, elle démontre que le transfert de connaissances des UCR ne peut pas être considéré comme une entité homogène, car il se produit par le biais de multiples canaux de connaissances, produisant chacun des résultats différents au niveau de l'entreprise. Bien que les agtechs au Brésil et en France dépendent moins des connaissances des UCR que prévu initialement, deux canaux de transfert de connaissances se sont avérés efficaces pour les agtechs au Brésil, tandis que cinq l'étaient en France. Deuxièmement, la recherche a identifié différentes combinaisons de compétences qui améliorent la performance des NEBT dans les deux pays, soulignant différentes stratégies de croissance. Les résultats de l'étude mettent en évidence l'importance de l'interaction entre les compétences, car aucune compétence ordinaire seule ne peut conduire à des niveaux de performance supérieurs. En identifiant les canaux de transfert de connaissances les plus efficaces et les combinaisons de compétences ordinaires qui conduisent à une performance supérieure, cette étude fournit des perspectives précieuses pour la Resource-Based View (RBV) et la Knowledge Spillover Theory (KST).

Mots-clés : Agtech ; Capacités ordinaires ; Performance ; Écosystème de connaissances ; Canaux de transfert de connaissances ; Universités et centres de recherche.

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LIST OF ABBREVIATIONS AND ACRONYMS

CSO	Corporate Spinoff
DC	Dynamic capability
DCV	Dynamic capability view
fsQCA	Fuzzy-set Qualitative Comparative Analysis
KSTE	Knowledge Spillover Theory of Entrepreneurship
KTC	Knowledge transfer channels
OC	Ordinary capability
NTBF	New technology-based firm
RBV	Resource-Based View
TTO	Technology transfer office
UCC	University core competence
URC	University and Research Center

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1 INTRODUCTION

New technology-based firms (NTBFs), also known as startups, are small and young firms that operate in high-technology industries and are not affiliated with a larger corporate group (GARCÍA-CABRERA; GARCÍA-SOTO; OLIVARES-MESA, 2019; SPENCE; CRICK, 2006). These firms operate in highly dynamic and uncertain environments, and their success relies on their ability to develop and implement a repeatable, scalable, and profitable business model that can take advantage of market opportunities (BLANK; DORF, 2012; EHRENHARD et al., 2017; FENG et al., 2019; OLIVA et al., 2019; RIES, 2011).

NTBFs are widely recognized as an important source of technology development, thereby breaking with the inertia of established organizations and nourishing economic growth (FONTES; COOMBS, 2001; JENSEN; CLAUSEN, 2017). NTBFs are reshaping markets, consumption patterns and ways of working by providing new, better and/or cheaper products and services (BLANK, 2013; RIES, 2011). Social and professional internet-based networks, environmental-related technologies, and new biological solutions are only a few examples of how these innovative firms are improving worldwide living standards, quality of life, and economic productivity (DUTIA, 2014; JENSEN; LÖÖF; STEPHAN, 2020). Moreover, new ventures that achieve high performance create a disproportionate number of jobs (BARBERO; CASILLAS; FELDMAN, 2011; HALTIWANGER; JARMIN; MIRANDA, 2013; LI et al., 2016).

However, few NTBFs succeed in overcoming their liabilities of smallness and newness – which are increased by the innovativeness of their businesses – to experience higher levels of performance (LÖFSTEN, 2016; MCGRATH; MEDLIN; O'TOOLE, 2019; RANNIKKO et al., 2019). These firms often lack a strong resource base, including specialized knowledge and capabilities, which can hinder their performance (DEVIGNE et al., 2013). The performance of New Technology-Based Firms (NTBFs) is a complex phenomenon, and many questions remain unanswered. Two main concerns arise.

First, from the Resource-Based View (RBV) perspective, existing research has been instrumental in guiding strategic decisions related to the selection and valuation of capabilities. Nevertheless, there has been noticeably less emphasis on the management and orchestration of these capabilities, particularly within the NTBF sector (ZAHRA, 2021). For instance, a significant portion of research has attempted to account for the performance of NTBFs by evaluating the impact of individual capabilities in isolation. This approach overlooks the fact that achieving superior performance in NTBFs requires overcoming diverse challenges that are inherent to a wide array of unique and complex operations, all of which demand simultaneous application of various capabilities (FISCHER et al., 2021).

In this context, a new paradigm has emerged (e.g., SIRMON et al., 2011; SYMEONIDOU et al., 2022; SYMEONIDOU; NICOLAOU, 2018). This paradigm proposes that superior firm performance is not merely reliant on the possession of valuable resources, such as capabilities. Rather, it also depends on the ability to integrate these resources and align them with strategic objectives. This alignment fosters competitive advantages and facilitates the attainment of desired outcomes (GARCÍA-CABRERA; GARCÍA-SOTO; OLIVARES-MESA, 2019). However, the evidence remains inconclusive, especially within the NTBFs sector. Given the innovative nature of their operations, these firms may face situations where required capabilities are not readily available. In such cases, entrepreneurs are compelled to either generate these resources from scratch or creatively recombine existing resources using proprietary processes (ZAHRA, 2021).

The second concern is about how these capabilities are accessed or developed (see, DONADA; NOGATCHEWSKY; PEZET, 2016; LINDEN; BITENCOURT; MULLER NETO, 2019; MINOLA; HAHN; CASSIA, 2021). Despite the abundance of literature exploring capability development in established companies, there remains a distinct lack of evidence concerning how new ventures – such as NTBFs – build internal capabilities that enhance their performance. The development process within NTBFs often differs significantly from that of established companies. Established firms benefit from a suite of pre-existing capabilities, which serve as the foundation for the creation of new ones. Conversely, NTBFs typically start from scratch, leading to a process that is often more resource-intensive and time-consuming (SYMEONIDOU et al., 2022).

Therefore, due to their limited resources and the high uncertainty characterizing their operating environment, NTBFs need to access, activate, and co-shape resources with other organizations in their network to overcome these liabilities and remain competitive (FENG et al., 2019; GARNSEY; LEONG, 2008). They commonly rely on knowledge ecosystems, composed of universities and research centers (URCs) (CLARYSSE et al., 2014; COLOMBELLI, 2016; JÄRVI; ALMPANOPOULOU; RITALA, 2018; MINOLA; HAHN; CASSIA, 2021), as the main source of specialized knowledge. However, it is still unclear which are the best processes and/or mechanisms through which NTBFs could exploit the knowledge generated within URCs (JIANG; MURMANN, 2022; MINOLA; HAHN; CASSIA, 2021). Therefore, identifying the best mechanisms of transferring knowledge from URCs should help NTBFs to develop the resources that, ultimately, would improve their performance (GARCÍA-CABRERA; GARCÍA-SOTO; NIEVES, 2021). This perspective is grounded in the Knowledge Spillover Theory of Entrepreneurship (KSTE) (ACS; AUDRETSCH; LEHMANN, 2013; JIANG; MURMANN, 2022; MINOLA; HAHN; CASSIA, 2021).

In knowledge ecosystems, URCs play a major role by recreating and rebuilding knowledge continuously within a dynamic flux (ATTOUR; LAZARIC, 2020), which enable them to provide support for innovative activities (see KRUGER; STEYN, 2020; MILLER et al., 2016; SCUOTTO et al., 2020). Given this capacity and that NTBFs generally are not able to innovate relying just on its own knowledge available internally, URCs frequently have acted as seedbeds of NTBFs (CLARYSSE et al., 2014; RASMUSSEN; WRIGHT, 2015).

The relationships between URCs and firms, as well as the knowledge transfer activities that occur between them, are not a new phenomenon. For example, there is a wealth of evidence about the factors that enable the transfer of knowledge from URCs (e.g., BOZEMAN; RIMES; YOUTIE, 2015; RASMUSSEN; WRIGHT, 2015) and that these activities can occur through multiple channels, leading to various outcomes (see ALEXANDER; MARTIN, 2013; BECERRA; CODNER; MARTIN, 2019; FRANCO; HAASE, 2015). However, the social and economic impact of this process remains understudied, particularly in non-scientific settings (FINI et al., 2018; KRUGER; STEYN, 2020). Much of the research has focused on the benefits for the URCs and therefore restricted their analyses to simple measures such as the number of patents, spin-offs, and licenses (HMIELESKI; POWELL, 2018). Additionally, it is widely acknowledged that knowledge is embedded in the people and systems throughout the ecosystem, and effectively transferring and recombining it remains a challenge (ATTOUR; LAZARIC, 2020).

Consequently, little is known about which are the most effective knowledge transfer channels and to what extent the knowledge transferred from URCs is converted into effective outcomes in external settings (FINI et al., 2018). Likewise, it is still not clear how such a process supports the development of capabilities at the firm level. Most studies have explored the influence of internal firm assets on the development of their capabilities (e.g. BUENSTORF; HEINISCH, 2020; COLOMBO; GRILLI, 2005), but have neglected the role played by the knowledge that flows in knowledge ecosystems where NTBFs are inserted (ROUNDY; FAYARD, 2019). Recent research has started to address this issue (e.g., KNOCKAERT; SPITHOVEN; CLARYSSE, 2014; WITHANAARACHCHI, 2020; YAN, 2019), but the evidence is far from conclusive.

Additionally, the heterogeneity of innovation systems adds more complexity to this context, as the ways of transferring knowledge can be managed and prioritized in unique ways for each environment (ALEXANDER; MARTIN, 2013). This occurs because innovation mechanisms, policy incentives, technical skills, research systems, and the ability to facilitate and coordinate these activities, among other factors, are heterogeneously distributed within innovation systems (see KRUGER; STEYN, 2020; MARR; PHAN, 2020). For this reason, it is expected large differences between knowledge transfer activities carried out in developed and developing countries.

Taken together, previous studies on the performance of new technology-based firms (NTBFs) suggest that: (1) much of the research on the RBV has traditionally focused on examining how individual resources determine firm performance. However, this is a complex phenomenon that cannot be fully explained by the presence or absence of a single resource. (2) NTBF performance is not solely contingent on the possession of valuable resources; rather, it is contingent on the strategic orchestration of these resources to gain a competitive edge in their unique contexts. Consequently, it's the intricate interplay and combination of multiple resources that ultimately define the performance of NTBFs. Therefore, the evolving paradigm within the RBV theory suggests that various resource configurations should equally contribute to NTBF performance; (3) The processes through which NTBFs access and develop the essential resources required for their survival and growth are still not comprehensively understood. For example, NTBFs frequently rely on URCs to access valuable resources like specialized knowledge and network connections. Nevertheless, the most effective mechanisms by which NTBFs can obtain these resources and the subsequent impact on their firm-level outcomes still lack comprehensive understanding.

In light of the context, a key question emerges: *How do universities and research centers (URCs) support the development of ordinary capabilities in new technology-*

based firms (NTBFs) through various knowledge transfer processes, and how do these resources contribute to improved business performance? Thus, the primary aim of our research is to explore how knowledge transferred from URCs aids NTBFs in developing the essential ordinary capabilities they require and how these resources are strategically configured to improve firm performance.

To effectively operationalize this overarching objective, we have subdivided it into three specific objectives tailored to provide comprehensive insights into the central research question:

a) To evaluate the effectiveness of knowledge transfer channels from universities and research centers (URCs) in supporting the development of ordinary capabilities in NTBFs.
b) To examine whether the presence or absence of individual essential ordinary capabilities alone is sufficient to achieve high levels of performance in NTBFs.
c) To identify different configurations of ordinary capabilities that can lead high performance in NTBFs.

We concentrated on ordinary capabilities because they allow firms to “make a living” or “[do] things right” in the core business functions (TEECE, 2014; WINTER, 2003). Ordinary capabilities are sets of resources and competencies that are employed in operational activities (RAZMDOOST; ALINAGHIAN; LINDER, 2020; WANG; AHMED, 2007; ZOLLO; WINTER, 2002), and therefore are strictly related to firm performance (TEECE, 2014).

Additionally, we decided to focus on a specific type of new technology-based firms (NTBFs): agtechs. Agtechs are NTBFs that provide innovative technologies and solutions in the agribusiness and food sectors (DUTIA, 2014). Our decision to concentrate on agtechs is based on the greater challenges they face when compared to other NTBFs in terms of innovating and commercializing their services or products (see BOEHLJE; ROUCAN-KANE; BRÖRING, 2011; SNEDDON; SOUTAR; MAZZAROL, 2011). These challenges may have led to a significant dependence on the support and knowledge provided by universities and research centers (URCs). In fact, around 60% of European biotechnology-based firms – such as agtechs – have emerged in proximity to URCs (BONARDO; PALEARI; VISMARA, 2010).

Furthermore, our research was conducted within the Brazilian and French contexts. Both nations hold significant positions in the agribusiness industry and cultivate conducive environments for agtech development (AGRESTE, 2020; CEPEA, 2022; EUROPEAN COMMISSION, 2020; FAO, 2021). Simultaneously, they exhibit distinct institutional frameworks, which could potentially influence the formation of diverse knowledge ecosystems. Therefore, the intersection of these two factors renders a uniquely intriguing research context.

In addressing our first specific objective, we utilized the Mann–Whitney U test to compare the cases of Brazilian and French agtechs. As anticipated, we observed significant differences between the effectiveness and outcomes of the knowledge transfer channels in Brazil and France. Our findings indicate that, due to variances in the structure and maturity of knowledge ecosystems, certain mechanisms perform more efficiently in one context than in another. Moreover, the same channels yield diverse outcomes in terms of ordinary capability development in Brazilian and French agtech firms.

French agtech firms seem to achieve greater success in transferring knowledge from URCs through various channels, such as services and consultancies, joint R&D, researchers in company, public-private networks, and training of human resources. Conversely, the influence of URC-derived knowledge on Brazilian agtechs appears to be more circumscribed, with only human resource training and NTBF development programs yielding positive results, particularly in terms of technological and innovation capabilities.

Our study underscores that the transfer of knowledge from URCs should not be perceived as a monolithic process. Rather, it should be channeled through diverse methods, each contributing varied impacts within firms. Consequently, each method of knowledge transfer should be evaluated for its potential to assist in the cultivation of specific capabilities.

For our second specific objective, we employed a necessity analysis, a specific test within the fsQCA method. Our findings conclusively demonstrate that no single ordinary capability, taken in isolation, can effectively determine high-performance levels in agtechs across both Brazil and France. This evidence confirms recent research (e.g., FENG; MORGAN; REGO, 2017) which posits that a specific ordinary capability, irrespective of its value, rarity, inimitability, and non-substitutability (VRIN), cannot create the necessary conditions for achieving high-performance levels unless combined with other essential capabilities.

Attaining success involves overcoming the diverse challenges inherent in a multitude of distinct and complex operations. Hence, our findings reinforce the view that NTBFs should equip themselves with a broad spectrum of ordinary capabilities, as recommended by B. Fischer et al. (2021), rather than relying solely on one. This insight also underscores a potential shortcoming in the 'traditional view' of the Resource-Based View (RBV) approach, which in its assessment of NTBFs' performance, tends to gauge the stand-alone potential of a specific capacity.

In pursuit of our third specific objective, we conducted a sufficiency analysis using the fsQCA method. Our findings support the initial assumption that high performance in agtechs can be explained by multiple and different configurations of capabilities in each context. Specifically, we identified four different configurations of ordinary capabilities in Brazil and six configurations in France that can yield comparably high performance levels in agtechs. These configurations highlight three different strategic patterns of growth in each context.

In summary, our findings in Brazil indicate that while one pattern is 'resourceful', allowing firms in this group to easier overcome barriers to growth, the other two strategic patterns highlight how entrepreneurs deal with resource scarcity through outsourcing or in-house capabilities. Similarly, in France, there is also a 'resourceful' pattern which favors agtech performance. The other two strategic patterns can be characterized as "focused on well-organizing and executing business processes" and "focused on achieving high-tech outcomes".

Our findings align with recent research suggesting that growth strategies employed by firms are diverse and consequently pose unique internal challenges. These challenges require firms to engage in different activities and manage a range of important capabilities to optimize performance. Furthermore, our results resonate with a recent shift in RBV literature, which advocates for a resource orchestration perspective.

This perspective encourages firms to seek an optimal alignment between acquired resources and implemented strategies to enhance performance outcomes. Our results lend support to this paradigm shift, emphasizing that achieving exceptional performance relies not only on available capabilities, but also significantly on how firms manage and configure these resources. A detailed discussion on these findings is provided in Sections 4 and 5.

Drawing from our findings, we created a framework that illustrates how universities and research centers (URCs) can assist in the development of ordinary capabilities in agtechs through various processes of knowledge transfer. Furthermore, the framework delves into how these capabilities can be strategically configured to optimize business performance in agtechs in both Brazil and France.

1.1 RESEARCH CONTRIBUTIONS

Our study shows the critical importance of effective resource configuration and knowledge transfer mechanisms from universities and research centers (URCs) in achieving high levels of performance in agtech firms. Our findings challenge the traditional view that simply having valuable resources is enough for NTBFs to achieve superior performance, instead emphasizing the need for possessing multiple resources and aligning them with the business growth strategy. We also demonstrate the complex and nuanced nature of knowledge transfer from URCs, which is influenced by the specific context and type of knowledge being transferred. These contributions have significant theoretical and practical implications for the agtech industry.

1.1.1 Theoretical contributions

From a theoretical perspective, our findings contribute to both the Resource-Based View (RBV) and the Knowledge Spillover Theory (KST). With regards to the RBV, our results challenge the conventional belief that having valuable resources is enough for NTBFs to achieve superior performance (e.g., BARNEY, 1991, 1995). We discovered that even when equipped with highly developed ordinary capabilities, no single valuable resource independently led to exceptional performance among French and Brazilian agtechs. This suggests that a single resource, regardless of its value, cannot produce desired outcomes on its own (SAVARESE; ORSI; BELUSSI, 2016). Instead, NTBFs need an array of valuable resources to accomplish their goals, highlighting a level of interdependence among the firm's various capabilities. This concept aligns with the complementary effect, as discussed in numerous studies (AHMADI; O’CASS, 2018; AHMADI; O’CASS; MILES, 2014; FENG; MORGAN;

REGO, 2017; ORR; BUSH; VORHIES, 2011). As such, focusing solely on the isolated impact of a single capability on the performance of NTBFs can be potentially misleading (BARBERO; CASILLAS; FELDMAN, 2011), as it is comparable to attributing the success of a specific culinary recipe to one ingredient. Consequently, our research enriches the RBV by emphasizing that NTBFs should be viewed as intricate systems that require a combination of valuable resources to guarantee their success.

Moreover, our study contributes to RBV by demonstrating that, in addition to possessing multiple valuable resources, effective resource configuration is necessary to enhance NTBF performance (DOBBS; HAMILTON, 2007; HAMANN et al., 2013). Given that there are various growth strategies that can be equally successful (DOTY; GLICK; HUBER, 1993; GARCÍA-CABRERA; GARCÍA-SOTO; OLIVARES-MESA, 2019), it is possible to assume that different configurations of ordinary capabilities can produce equally effective results, as long as they are well-aligned with the business growth strategy (CLARYSSE; BRUNEEL; WRIGHT, 2011; DOBBS; HAMILTON, 2007). Therefore, there is no single configuration of ordinary capabilities that favor achieving high levels of performance in NTBFs. In the specific context of agtechs, we identified four configurations in Brazil and six in France, which underlie three different growth strategies in each country.

For instance, despite being widely recognized as crucial for NTBFs (DELIGIANNI et al., 2019; LEE; LEE; PENNINGS, 2001; MINOLA; HAHN; CASSIA, 2021), technological capabilities are not a prerequisite for success in all agtechs, as we found in our study. Some agtechs can develop innovative solutions based on existing or low-tech technologies, or even outsource technical knowledge acquisition. This is exemplified by the "top performer" group in France, who lack strong technological capabilities and network capabilities to overcome knowledge deficiencies. Instead, they excel in organizational and execution capabilities, enabling them to perform well operationally. In summary, our study adds to the RBV theory by showing that the success of agtechs in achieving higher levels of performance depends not only on possessing one or multiple valuable resources, but on owning and configuring these resources appropriately in line with the business growth strategy (DOBBS; HAMILTON, 2007; HAMANN et al., 2013).

Drawing on the Knowledge Spillover Theory (KST), our study contributes to the growing body of literature that seeks a more profound understanding of how firms develop their capabilities (e.g., DONADA; NOGATCHEWSKY; PEZET, 2016; GLIGA; EVERS, 2023; LINDEN; BITENCOURT; MULLER NETO, 2019). We address this topic by illustrating the extensive influence of URC knowledge, which extends beyond academic and scientific spheres. Previous research has primarily focused on the direct benefits for URCs, utilizing straightforward metrics such as patent counts, spin-off numbers, and licensing agreements (HMIELESKI; POWELL, 2018). In contrast, our investigation challenges this conventional approach by illustrating how the transfer of URC knowledge fosters the development of ordinary capabilities within agtechs. We examine the knowledge flow dynamics within agtechs and explore their potentially unique impacts (JIANG; MURMANN, 2022).

Our findings reveal that the transfer of URC knowledge is a multi-faceted process, taking place through various channels, each yielding unique outcomes at the firm level. Although agtechs may not heavily rely on URC knowledge transfer, our research pinpoints specific channels that effectively bolster capability development within these firms, while others may not produce significant results.

Moreover, our study addresses many calls to examine the influence of context on knowledge transfer activities (MINOLA; HAHN; CASSIA, 2021) and capability development (BRUSH; ARTZ, 1999; KETATA; SOFKA; GRIMPE, 2015). Our research underscores that the effectiveness of different knowledge transfer mechanisms may vary depending on the types of knowledge and the ecosystem in which the involved parties, such as URCs and NTBFs, operate. For instance, we discovered that the HR Training channel effectively fosters technological and innovation capabilities in Brazilian agtechs, whereas in France, the same channel is more adept at enhancing financial and organizational capabilities. These findings reinforce the concept that knowledge spillover from diverse contexts is far from homogeneous (FRYGES; WRIGHT, 2014; MINOLA; HAHN; CASSIA, 2021).

In summary, our study contributes to the KST by demonstrating that knowledge transfer activities should occur through various means and generate diverse outcomes beyond the academic setting. We emphasize that the effectiveness of URC knowledge transfer depends on the specific type of knowledge being transferred, the transfer mechanism employed, and the context of the parties involved.

1.1.2 Practical contributions

From a managerial perspective, it is crucial to emphasize that relying solely on a single capability is insufficient for ensuring business performance in the agtech sector. Many NTBF entrepreneurs erroneously believe that possessing certain "special" capabilities will guarantee their business success. An apparent misunderstanding is the belief that technological capabilities exclusively constitute the foundation of any NTBF. This restrictive perspective, with its focus on technological advancement, often undervalues critical aspects like marketing or innovation capabilities, contributing to the failure of numerous NTBFs. To achieve business success, agtech entrepreneurs must acknowledge the importance of cultivating a diverse range of capabilities that align with their business objectives.

Secondly, our study demonstrates that there is no standard set of capabilities that firms should develop, nor is there a single winning strategy. This implies that a one-size-fits-all approach is ineffective for attaining high levels of performance and growth. We identified three distinct successful growth strategies for agtechs in each country. Based on this insight, we propose two critical guidelines for entrepreneurs: (a) Multiple pathways can lead to success for agtechs, with each route involving different strategies necessitating the development of unique capabilities. (b) Agtechs are not required to internally develop all eight ordinary capabilities. Rather, agtech entrepreneurs should prioritize nurturing capabilities that align with their growth strategy, as not all capabilities may be essential for their business. Conversely, agtechs may opt to tailor their growth strategy to leverage the capabilities they already possess internally, thereby enhancing their performance. Consequently, our findings equip agtech entrepreneurs with the ability to determine the optimal fit between growth strategy and the necessary capabilities. Our research framework provides a comprehensive guide, aiding entrepreneurs in formulating the appropriate strategy and fostering the requisite capabilities.

Third, after identifying the optimal growth strategy and specifying the capabilities to be refined, our findings also offer a valuable reference for establishing fruitful collaborations with universities and research centers. Not all knowledge transfer channels proved effective in developing capabilities at the firm level, so selecting the right mechanism directly impacts the successful development of these capabilities.

These partnerships can aid in the development of capabilities typically underdeveloped in agtechs, ultimately supporting their overall growth and success.

In Brazil, our research reveals that HR Training effectively fosters the development of technological and innovation capabilities, while the NTBF Development Program bolsters innovation capabilities. In France, we found that six URC knowledge transfer channels efficiently promote the growth of ordinary capabilities. These channels include Services and Consultancies, Joint R&D, Company in Researchers, Networking, and HR Training.

In conclusion, from a societal perspective, our findings can contribute to the aspirations of both French and Brazilian territories to become global leaders in agroecology. The Breton agrifood sector provides sustenance for one in three French citizens, and Brittany stands as the foremost agricultural region in France as well as a leading agrifood hub in Europe (BUREAU DES CONGRÉS, 2022; CHAMBRES D'AGRICULTURE DE BRETAGNE, 2021). Brazil ranks as the fourth-largest global producer of cereals and the third-largest for fruits and meats (ARAGÃO; CONTINI, 2021).

Despite the significant contribution of agricultural production to both Brazilian and French economies, existing production practices in these countries remain highly polluting and poorly profitability. By assisting agtech companies in aligning knowledge transfer channels, ordinary capabilities, and growth strategies, our research facilitates the development of innovative solutions that can significantly improve production efficiency. This alignment with the agri-food sector supports the United Nations' Sustainable Development Goals, such as "Zero Hunger" and "Good Health and Well-Being," ultimately promoting societal well-being and environmental sustainability.

This shows that our results can prove beneficial to other stakeholders beyond agtech entrepreneurs. Our findings can aid agtech constituents such as policymakers and investors by providing valuable information that allows them to refine development policies and programs, thereby enhancing their success in supporting agtech growth. For example, our insights could generate valuable knowledge for the managers of universities and research centers to restructure their support programs, such as incubation, acceleration, and mentoring initiatives, among others.

In summary, our study highlights that: (1) the importance of developing diverse capabilities in the agtech sector, rather than solely relying on a single capability; (2) It demonstrates that no standard set of capabilities or single winning strategy exists, and proposes two critical guidelines for entrepreneurs; (3) The findings also stress the value of collaborations with universities and research centers to develop firm-level capabilities (4) The research contributes to the aspirations of both countries to become global leaders in agroecology and supports the United Nations' Sustainable Development Goals.

1.2 RESEARCH STRUCTURE

This research is organized in six main sections. In Section 1, we introduce key aspects of our study, such as the research context, identified theoretical gaps, objectives, and potential contributions. We summarize how we addressed each objective and the findings from our investigation.

In Section 2, we provide the theoretical foundation that underpins our research. This section elaborates on the importance of ordinary capabilities as drivers for NTBF performance and explains why these firms should rely on URC knowledge to develop their capabilities. Furthermore, we discuss the process of knowledge transfer from URCs, highlighting the complexity of this phenomenon.

In Section 3, we outline the research methods employed to achieve our goals, which are organized into three broad phases. Additionally, we detail the agtech ecosystems in Brazil and France, which are the focus of this study. In Section 4, we present our findings, followed by a discussion in Section 5. Lastly, in Section 6, we offer our concluding thoughts and address the limitations of our research.

2 THEORETICAL BACKGROUND

This section presents the theoretical foundation that guided the development of the research. The literature review is divided into three main topics. Firstly, we describe what NTBFs are, where they operate, how they differ from other businesses, and why most of them fail. We also discuss NTBF performance and the challenges of understanding this phenomenon. Secondly, we present our theoretical perspective on ordinary capabilities and explore the various types of capabilities that NTBFs must develop to leverage their performance. Despite the advancements in this field, there is still a lack of understanding on how NTBFs develop and configure these capabilities to leverage their performance. Lastly, we examine the various channels through which knowledge can be transferred from universities and research centers (URCs) to NTBFs and why these processes are crucial for understanding capability development. Based on the following evidence, we identify the research gaps and present our propositions.

2.1 THE PERFORMANCE OF NEW TECHNOLOGY-BASED FIRMS

New technology-based firms (NTBFs) are organizations that are established with the goal of identifying, testing, and developing a sustainable, scalable, and profitable business model (BLANK; DORF, 2012; EHRENHARD et al., 2017; OLIVA et al., 2019; RIES, 2011). NTBFs play a vital role in the Schumpeterian process of creative destruction and are a key driver of economic growth (GIMENEZ-FERNANDEZ; SANDULLI; BOGERS, 2020). They are also instrumental in introducing new technologies to the market (SCUOTTO et al., 2020) and fostering economic development (BALBONI et al., 2019; SCHNEIDER; VEUGELERS, 2010; WIKLUND; SHEPHERD, 2005).

NTBFs are innovative companies that operate in high-technology industries and are not affiliated with a corporate group (GARCÍA-CABRERA; GARCÍA-SOTO; OLIVARES-MESA, 2019; SPENCE; CRICK, 2006). They are characterized by having fewer than 250 employees (EUROSTAT, 2020; GARCÍA-CABRERA; GARCÍA-SOTO; OLIVARES-MESA, 2019) and being less than 10 years old (AMEDOFU; ASAMOAH; AGYEI-OWUSU, 2019; RIPSAS; TRÖGER, 2014). They are commonly referred to as "startups" in practitioner literature, but this term is also used to refer to other types of businesses that are not necessarily technology-based or innovative (e.g., ALDRICH;

YANG, 2014; LA ROCCA et al., 2019; LEBRASSEUR; ZINGER, 2005). In this research, we use the term "NTBF" to specifically refer to these innovative, technology-based firms, as opposed to using the more general term "startup."

NTBFs differ significantly from established firms in many ways (MCGRATH; MEDLIN; O'TOOLE, 2019). Due to their innovative nature, they operate in highly uncertain ecosystems (PARADKAR; KNIGHT; HANSEN, 2015; PARK, 2005) and often have limited resources, making them vulnerable to a variety of risks (OLIVA et al., 2019). NTBFs typically lack financial resources (PARADKAR; KNIGHT; HANSEN, 2015), technological and marketing capabilities (HUANG; LAI; LO, 2012), and the competencies of the core team (CHOREV; ANDERSON, 2006; FENG et al., 2019). This combination of operating in a high-uncertainty environment with limited resources creates a perfect storm that has resulted in high mortality rates among NTBFs (BLANK; DORF, 2012; OLIVA et al., 2019; PICKEN, 2017), particularly in transitioning economies (AHMADI; O'CASS, 2018; BRUTON; SU; FILATOTCHEV, 2018). As a result, innovation can be a significant challenge for many of these new, small, and independent firms (ATUAHENE-GIMA; LI; DE LUCA, 2006; GARCÍA-CABRERA; GARCÍA-SOTO; NIEVES, 2021).

These limitations faced by NTBFs are related to what researchers have referred to as "liability of smallness and newness" (FREEMAN; CARROLL; HANNAN, 1983; STINCHCOMBE, 1965). The liability of smallness is associated with the lack of resources to effectively implement business strategies and routines (GIMENEZ-FERNANDEZ; SANDULLI; BOGERS, 2020). For example, NTBFs often struggle to hire and retain employees during their formative years due to cash shortages (BOUDREAUX, 2021). The liability of newness is related to the difficulties that new ventures face in competing effectively against established firms (GIMENEZ-FERNANDEZ; SANDULLI; BOGERS, 2020). During their formative years, they typically struggle to develop efficient routines and create a solid organizational structure, which results in low levels of legitimacy (RASMUSSEN; WRIGHT, 2015; ZIMMERMAN; ZEITZ, 2002) and unstable connections with customers, suppliers, and partners (FREEMAN; CARROLL; HANNAN, 1983).

Given this context of limited internal resources and high uncertainty in which NTBFs operate, many studies have explored the impact of internal resources on NTBF performance (ASPELUND; BERG-UTBY; SKJEVDAL, 2005; HUANG; LAI; LO, 2012; NEWBERT; KIRCHHOFF; WALSH, 2007). However, while these studies have found that initial resources do have an impact on NTBF performance, it is not just the possession of resources but rather how these firms leverage them that determines their performance (FENG et al., 2019; NEWBERT; KIRCHHOFF; WALSH, 2007).

Therefore, NTBFs need to address these deficits by accessing, activating, and co-shaping resources with other organizations in their network (FENG et al., 2019; GARNSEY; LEONG, 2008). This is necessary to ensure high levels of performance and survival in these firms, which are dependent on strategic relationships, especially with established firms and universities and research centers (URCs) (COLOMBELLI, 2016; FRYGES; WRIGHT, 2014; MCGRATH; MEDLIN; O'TOOLE, 2019). Considering that knowledge is the most valuable asset for increasing business responsiveness (AHMADI; O'CASS, 2018), URCs can be seen as the primary sources of knowledge for many NTBFs (AGARWAL; SHAH, 2014; MINOLA; HAHN; CASSIA, 2021).

2.1.1 Exploring the performance of NTBFs through the RBV

The performance of small and medium enterprises, such as NTBFs, is widely considered as the primary indicator of business success (CLARYSSE; BRUNEEL; WRIGHT, 2011; DAVIDSSON; STEFFENS; FITZSIMMONS, 2009; HAMANN et al., 2013). This topic has been the subject of extensive academic research for over four decades (HART; PRASHAR; RI, 2021; WRIGHT et al., 2015). Firm performance is closely related to the concept of organizational effectiveness (HAMANN et al., 2013), which refers to the degree to which organizations are achieving their intended goals and objectives (STRASSER et al., 1981).

Despite ongoing debate and controversy among academics, practitioners, and policy makers (HART; PRASHAR; RI, 2021), there is a broad consensus on the importance of high-performing small businesses for improving economic and social conditions (AYYAGARI; DEMIRGÜÇ-KUNT; MAKSIMOVIC, 2011; GIBB; DAVIES, 1990; GIMENEZ-FERNANDEZ; SANDULLI; BOGERS, 2020; OECD, 2017). They are known to have a positive impact on employment levels, as they tend to create more jobs and have higher survival rates (BALBONI et al., 2019; DOBBS; HAMILTON, 2007; ROBBINS et al., 2000). They also tend to be more innovative and better able to adapt to market changes (GIMENEZ-FERNANDEZ; SANDULLI; BOGERS, 2020). Furthermore, high-performance small businesses are also seen as a means to promote women empowerment, by providing them with greater access to economic opportunities and resources (HECHAVARRIA et al., 2019).

However, it is crucial to acknowledge that while many new technology-based firms (NTBFs) have been established, few have sustained success over time. More than two-thirds of them never delivered a positive return to their investors (EISENMANN, 2021). In fact, the performance of most small businesses tends to be characterized by irregular and discontinuous growth patterns rather than linear or steady progress (HART; PRASHAR; RI, 2021). As such, periods of expansion may be followed by periods of consolidation or stagnation (GARNSEY; STAM; HEFFERNAN, 2006).

Firm performance is a complex subject that has been studied from many different perspectives. According to Wiklund et al. (2009), these studies can be grouped into four categories: entrepreneurial orientation, environment, strategic fit, and resources. Our research focuses on the resources perspective, which is based on the Resource-Based View (RBV) theory (BARNEY, 1991; PENROSE, 1959; TEECE; PISANO; SHUEN, 1997). This theory states that a firm's performance is determined by its possession of valuable, rare, non-imitable, and non-substitutable (VRIN) resources (BARBERO; CASILLAS; FELDMAN, 2011; GEORGE, 2005; MORENO; CASILLAS, 2007). According to this perspective, resources encompass all assets, capabilities, processes, and knowledge held by firms (BARNEY, 1986; EDELMAN; BRUSH; MANOLOVA, 2005; GARCÍA-CABRERA; GARCÍA-SOTO; OLIVARES-MESA, 2019). Therefore, the RBV theory explains performance differences among NTBFs by the heterogeneity in their resources (AMEDOFU; ASAMOAH; AGYEI-OWUSU, 2019; MINOLA; HAHN; CASSIA, 2021; ZHANG et al., 2022).

Dobbs and Hamilton (DOBBS; HAMILTON, 2007) have referred to this approach as ‘deterministic’ because it aims to identify a set of stable variables related to the people, the firm, and its industry environment that can explain a significant portion of the observed variation in business performance levels. These variables include technological capabilities (e.g., ARORA; NANDKUMAR, 2012; DEEDS, 2001; LEE; LEE; PENNINGS, 2001), marketing capabilities (e.g., AHMADI; O’CASS; MILES, 2014; ARORA; NANDKUMAR, 2012; ZHOU et al., 2016), networking capabilities (MCGRATH; MEDLIN; O’TOOLE, 2019; PARIDA et al., 2017), capital structure (RAHAMAN, 2011), and others (for further examples, see ANTON, 2019, p. 211). Despite the progress and new evidence in this field, criticism remains regarding the low explanatory and predictive power of these empirical models in explaining business performance (HART; PRASHAR; RI, 2021; WRIGHT et al., 2015). This limitation is primarily attributed to two reasons, as evidenced by much of the research on the topic.

The first reason is related to the methodological approach used to assess firm performance (HART; PRASHAR; RI, 2021; MCKELVIE; WIKLUND, 2010). There is no consensus among scholars on how the performance of NTBFs should be measured. Many studies have exclusively relied on financial metrics to explain the performance of NTBFs, however, this approach is limiting (GARCÍA-CABRERA; GARCÍA-SOTO; OLIVARES-MESA, 2019). The prolonged process of technology development (ASPELUND; BERG-UTBY; SKJEVDAL, 2005) and the substantial financial investment in R&D for creating an innovative product (ZAHRA; NASH; BICKFORD, 1995) renders financial metrics inadequate in fully capturing NTBF performance. Furthermore, many studies have employed different performance measures (BOUDREAUX, 2021; HAMANN et al., 2013; VENKATRAMAN; RAMANUJAM, 1986), which has led to conflicting conclusions (DOBBS; HAMILTON, 2007; GARCÍA-CABRERA; GARCÍA-SOTO; OLIVARES-MESA, 2019).

The use of profit as the primary metric for measuring NTBF performance, at the expense of survival metrics, is an example of conflicting conclusions. It is not uncommon for NTBFs to survive without generating profits for extended periods, and this does not necessarily indicate that they were not performing well (BOUDREAUX, 2021). Thus, using profit as the sole metric without considering the survival index (or other metrics) can lead to biased conclusions. Furthermore, there is a similar dichotomy between sales and employment metrics. A firm can increase its sales without proportionately growing its workforce. (DOBBS; HAMILTON, 2007). Therefore, several researchers have proposed using multiple indicators to gauge firm performance (BOUDREAUX, 2021; DELMAR; DAVIDSSON; GARTNER, 2003; DOBBS; HAMILTON, 2007; HAVNES; SENNESETH, 2001). This methodological approach would provide a more accurate representation of NTBF performance (BOUDREAUX, 2021) and would be more effective in testing the robustness of theoretical models (DELMAR; DAVIDSSON; GARTNER, 2003; DOBBS; HAMILTON, 2007). Combs et al. (2005) proposed a methodological framework for assessing firm performance, which is composed of operational and organizational measures.

Operational performance refers to the achievement of operational objectives within different activities, which can ultimately result in improved organizational performance (COMBS; CROOK; SHOOK, 2005; HAMANN et al., 2013). Common operational performance measures are growth in market share (BEHL, 2022), product quality (ATUAHENE-GIMA; LI; DE LUCA, 2006), and customer loyalty (PARIDA et al., 2017).

Organizational performance can be understood as ‘‘the economic outcomes resulting from the interplay among an organization’s attributes, actions, and environment’’ (COMBS; CROOK; SHOOK, 2005, p. 261). This definition aligns with measurement practices in strategic management research, as most researchers evaluate firm performance using economic indicators. As such, measures of operational performance are both relevant to research and practice, as they represent the ultimate goal of economic activities for businesses (HAMANN et al., 2013). According to Combs et al. (2005), operational performance is composed of three distinct dimensions: accounting returns, stock market performance, and growth.

Accounting returns refer to a firm's historical performance measured through the financial accounting data from annual reports (FRYXELL; BARTON, 1990). Hamman et al. (2013) identified two different dimensions to be reflected by accounting returns indicators: liquidity and profitability. The first dimension relates to a firm's capacity to fulfill its financial obligations through the cash flow generated from its ongoing operations (PONIKVAR; ZAJC KEJŽAR; PELJHAN, 2018). The second dimension, profitability, evaluates a firm's ability to effectively utilize resources to generate profits. earnings (HAMANN et al., 2013). This metric is commonly used to evaluate the performance of NTBFs (e.g., ATUAHENE-GIMA; LI; DE LUCA, 2006; BEHL, 2022; LÖFSTEN; LINDELÖF, 2002, 2005).

In contrast to accounting returns which provide a historical perspective, stock market performance reflects a firm's expected future performance (FRYXELL; BARTON, 1990). This dimension is typically evaluated using indicators such as Total Shareholder Return (TSR). However, these indicators can be affected by factors such as capital market volatility, economic conditions, and investor sentiment (HAMANN et al., 2013; RICHARD et al., 2009). In the research on NTBFs, stock market performance is more commonly measured by the growth in firm valuation (e.g., BECKER; CLEMENT; NÖTH, 2016; GARKAVENKO et al., 2022; ZHENG; LIU; GEORGE, 2010).

Organizational growth could be defined as ‘a change in [firm] size over any given time period’ (Dobbs & Hamilton, 2007, p. 313), as indicated by metrics such as sales, employee count, and assets (HAMANN et al., 2013; WEINZIMMER; NYSTROM;

FREEMAN, 1998). Specifically, employment (e.g., BAPTISTA; PRETO, 2011; BORNHÄLL; DAUNFELDT; RUDHOLM, 2017; COAD, 2010) and sales turnover (e.g., ATUAHENE-GIMA; LI, 2004; LEE; LEE; PENNINGS, 2001; ORTÍN-ÁNGEL; VENDRELL-HERRERO, 2014) are more commonly used as indicators of growth in small business research (DELMAR; DAVIDSSON; GARTNER, 2003). Employment growth is of particular importance in the context of government policies as it can have a significant impact on addressing social issues such as reducing unemployment (DOBBS; HAMILTON, 2007; HOOGSTRA; VAN DIJK, 2004). Additionally, some researchers have argued that NTBFs normally grow in headcount before growing in sales (SAVARESE; ORSI; BELUSSI, 2016). Meanwhile, growth in sales is an important goal for entrepreneurs as it reflects a business's ability to generate wealth (DOBBS; HAMILTON, 2007). To mitigate analysis biases, this study employs five variables to compose the performance construct, which encompass all the dimensions proposed by Combs et al. (2005). This methodology is outlined in the research methods section.

The second reason for the limited explanatory and predictive ability of empirical models in understanding business performance is the narrow perspective within the resource-based tradition that assumes that a greater quantity and/or quality of resources inherently leads to higher levels of firm performance (CLARYSSE; BRUNEEL; WRIGHT, 2011). However, many scholars have raised doubts about this simplistic relationship (CLARYSSE; BRUNEEL; WRIGHT, 2011; DOBBS; HAMILTON, 2007; GARCÍA-CABRERA; GARCÍA-SOTO; OLIVARES-MESA, 2019; MORENO; CASILLAS, 2007; OLIVA et al., 2019). They argue that it is not only the stock of organizational resources that matters, but also the ability to transform these resources into competitive advantage, which ultimately results in higher levels of performance (CLARYSSE; BRUNEEL; WRIGHT, 2011; DOBBS; HAMILTON, 2007).

Sirmon et al. (2007) explain the process of how resources are transformed into configurations, by identifying the intermediate step of resource bundling. Following this logic, various capabilities can be bundled together to form different capability configurations, shaping unique business strategies, which ultimately explain variations in firm performance (CLARYSSE; BRUNEEL; WRIGHT, 2011; GRUBER et al., 2010). Thus, the configuration approach is particularly effective in overcoming such common limitation of RBV studies. From this approach, the superior performance is related to the proper alignment of a firm's relevant resources (DOTY; GLICK; HUBER, 1993).

This reasoning aligns with the principle of equifinality (NDOFOR; PRIEM, 2011; RAGIN, 2008; RIHOUX; RAGIN, 2009), which suggests that multiple, equally effective, organizational forms can lead to the same level of effectiveness. This means that a firm can reach its desired outcome through different initial conditions and by various pathways (DOTY; GLICK; HUBER, 1993; GARCÍA-CABRERA; GARCÍA-SOTO; OLIVARES-MESA, 2019). Therefore, the performance of NTBFs is determined by their ability to align their capabilities with their strategic objectives, thereby creating competitive advantages and achieving desired outcomes (GARCÍA-CABRERA; GARCÍA-SOTO; OLIVARES-MESA, 2019). The extent to which they are able to effectively configure the resources at their disposal is the key determinant of their overall performance (DOBBS; HAMILTON, 2007; HAMANN et al., 2013).

Taken together, previous studies suggest that: (1) Despite the emergence of many new technology-based firms (NTBFs), only a few have been able to overcome their limitations and achieve exceptional performance; (2) Previous research has often employed narrow methodological approaches when assessing the performance of NTBFs, resulting in inconsistent and misleading conclusions. In order to accurately measure NTBF performance, a set of organizational and operational measures should be utilized; (3) The strategic management literature has primarily focused on examining how individual resources can contribute to a firm's performance, ignoring the fact that the combination and arrangement of resources into different configurations can also provide valuable insights into multiple successful strategies that are equally effective in achieving high levels of performance.

In the following section, we provide an overview of firm capabilities in the context of the Resource-Based View (RBV) of the firm. We distinguish between dynamic and ordinary capabilities by highlighting their relationship with the firm's context. Furthermore, we outline the various types of firm capabilities and their influence on the performance of NTBFs.

2.2 ENHANCING NTBF PERFORMANCE THROUGH FIRM CAPABILITIES

Firms are composed of valuable resources that can provide distinct advantages, forming the foundation for positive outcomes when properly combined and exploited through unique firm capabilities (BARNEY, 1991; PENROSE, 1959; WERNERFELT, 1984). Therefore, a capability-centric perspective of a firm posits capabilities as the 'engine' of the firm, from which it develops the necessary conditions to survive and thrive. While this theoretical approach is still under development, there is no consensus on how to classify capabilities or how they interdependently create value (DASPIT; D'SOUZA, 2017). Nonetheless, it is commonly accepted that capabilities can be understood as "socially complex routines that determine the efficiency with which firms physically transform inputs into outputs" (COLLIS, 1994, p. 145). Similarly, Teece (2014, p. 328) defines them as "a set of current or potential activities that utilize the firm's productive resources to make and/or deliver products and services." Therefore, these definitions are guided by two key assumptions: (1) capabilities are deeply ingrained in firm routines, which are a product of the organization as a whole; (2) capabilities enable firms to create value by transforming inputs into outputs (DASPIT; D'SOUZA, 2017; NAGY; JAAKKOLA; KOPORCIC, 2019).

Indeed, recent literature has proposed various definitions and categorizations for firm capabilities, leading to differing interpretations. For example, the "bibliometrically defined bifurcation in the dynamic capabilities literature" (TEECE, 2014, p. 337) was nurtured for decades by Teece et al. (1997) on the one hand and Eisenhardt and Martin (2000) on the other. Despite these divergences, there is some consensus that firm capabilities can be categorized into two primary types: ordinary and dynamic capabilities (see KARNA; RICHTER; RIESENKAMPFF, 2016; NAGY; JAAKKOLA; KOPORCIC, 2019; TEECE, 2014).

Dynamic capabilities refer to the "firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments" (TEECE; PISANO; SHUEN, 1997, p. 516). Similarly, Eisenhardt and Martin (2000, p. 1107) pointed out that dynamic capabilities are the "organizational and strategic routines by which firms achieve new resource configurations as markets emerge, collide, split, evolve, and die." Despite some divergences, it's generally acknowledged that the essence of dynamic capabilities is to leverage tangible and intangible assets to generate competitive advantage (FALAHAT et al., 2020; SALUNKE; WEERAWARDENA; MCCOLL-KENNEDY, 2011) and achieve superior organizational performance over time (TEECE, 2007; ZOTT, 2003). This approach emerged as a response to flaws in the resource-based view (RBV) rationale, which cannot adequately explain how firms develop and retain competitive advantage in dynamic markets. The RBV alleges that holding valuable resources and capabilities per se is sufficient to foster superior performance (AREND; BROMILEY, 2009; HELFAT et al.,

2007; SIRMON; HITT; IRELAND, 2007; SYMEONIDOU; NICOLAOU, 2018). However, especially in high-technology business environments, where the competitive landscape is shifting, firms which are initially resource rich can rapidly exhaust their endowments and then fail (WU, 2007). Thus, Winter (2003) highlights that dynamic capabilities can be seen as a partial hedge against the obsolescence of firm capabilities and resources.

Ordinary capabilities, on the other hand, can be defined as bundles of resources and competencies that are employed in firms' operational activities (RAZMDOOST; ALINAGHIAN; LINDER, 2020; WANG; AHMED, 2007; ZOLLO; WINTER, 2002). These capabilities are frequently seen as 'best practices' because they enable firms to "make a living" (WINTER, 2003) or "[do] things right" in the core business functions of operations administration, and governance (TEECE, 2014). As highlighted by Teece (2014), ordinary capabilities are also commonly labeled as static (COLLIS, 1994), zero-level (WINTER, 2003), first-order (DANNEELS, 2002), or substantive capabilities (ZAHRA; SAPIENZA; DAVIDSSON, 2006).

As explained by Teece (2014, p. 331), "whereas ordinary capabilities are about doing things right, dynamic capabilities are about doing the right things, at the right time." Therefore, ordinary capabilities are at the bottom of operational activities, enabling firms to 'make a living' (NAGY; JAAKKOLA; KOPORCIC, 2019; WINTER, 2003) while dynamic capabilities allow firms to build and reconfigure "internal and external competences to address rapidly changing environments" (TEECE; PISANO; SHUEN, 1997, p. 516).

While both types of capabilities have been proven to favor firm performance separately (e.g., DRNEVICH; KRIAUCIUNAS, 2011), they explain performance in different ways. In this research, we concentrate on ordinary capabilities because recent research has shown that ordinary capabilities outperform dynamic capabilities in improving firm performance for high-tech firms, even in early stages and the very last stage (QAIYUM; WANG, 2018). Despite most literature in the last two decades suggesting that a dynamic environment favors dynamic capabilities (TEECE, 2014) and a stable environment is suited for ordinary capabilities (VORHIES; MORGAN; AUTRY, 2009), recent research has argued that it's not just because outside forces are favorable for dynamic capabilities that such a firm can support dynamic capabilities (QAIYUM; WANG, 2018).

Given their difference in nature, dynamic and ordinary capabilities play distinct roles in firm performance. They operate on the resource base in a distinct manner and thus have a different but direct impact on firm performance (PEZESHKAN et al., 2016; QAIYUM; WANG, 2018). When the portfolio of a firm is aligned with the desires of their market, ordinary capabilities should positively affect their performance because these proficiencies are related to 'best practices' that lead to operational efficiency. At the same time, dynamic capabilities may be important in earlier stages of the NTBFs where reconfiguration and adaptation are the buzzwords (TEECE, 2014).

Therefore, understanding how ordinary capabilities are related to NTBF performance is crucial. Little is known about how constraints of firm capabilities hinder high firm performance (GONZÁLEZ-URIBE; REYES, 2021). In the next section, we further explain the relationship between ordinary capabilities and NTBF performance.

2.2.1 The Impact of Ordinary Capabilities on the Performance of NTBFs

The role of ordinary capabilities in the performance of NTBFs has been widely investigated. Ordinary capabilities refer to the fundamental set of skills, resources, and competencies that are essential for efficient and effective management of a firm's core business functions, including operations, administration, and governance (TEECE, 2014; WINTER, 2003). These capabilities help firms to implement optimized processes and perform tasks correctly, contributing significantly to firm performance.

The literature provides robust empirical and theoretical evidence to support the positive relationship between ordinary capabilities and NTBF performance. For instance, empirical studies reveal that network, marketing, technology, and innovation capabilities play a crucial role in the performance of NTBFs (AHMADI; O'CASS; MILES, 2014; ARORA; NANDKUMAR, 2012; JENSEN; LÖÖF; STEPHAN, 2020; PARIDA et al., 2017; ZHENG; LIU; GEORGE, 2010). In this vein, Arora and Nandkumar (2012) and Ahmadi et al. (2014) found that technology and marketing capabilities positively impact the performance of new technology ventures. Similarly, Parida et al. (2017) found that network capabilities, mediated by firm innovativeness, enhance the performance of Swedish NTBFs, and F. Jensen et al. (JENSEN; LÖÖF; STEPHAN, 2020) found that NTBFs from the cleantech industries with stronger technological capabilities perform better.

Our systematic review of the literature identified four critical ordinary capabilities for NTBF performance, which cover most of the research to date: (1) network capabilities, (2) marketing capabilities, (3) technology capabilities, and (4) innovation capabilities. Networking capabilities refer to a firm's ability to initiate, maintain, and utilize relationships with various external partners to access valuable resources they need (WALTER; AUER; RITTER, 2006). Marketing capabilities include the experiential knowledge, skills, and related processes required to undertake marketing activities, while technological capabilities include the experiential knowledge, skills, and related processes necessary for designing, developing, and manufacturing new products and/or services (AHMADI; O'CASS; MILES, 2014). Finally, innovation capabilities refer to the learning and transforming of knowledge and ideas into new or improved products, processes, and systems to create value for the firm and its customers (BREZNIK; HISRICH, 2014).

Moreover, four additional capabilities specific to the NTBF context emerged from empirical findings: (5) financial capabilities, (6) human resource management (HRM) capabilities, (7) organizational capabilities, and (8) execution capabilities. While these capabilities have been explored in other specific contexts, they remain notably understudied within the realm of NTBFs. Financial capabilities refer to a firm's ability to manage financial resources effectively, such as securing funding and managing cash flow. HRM capabilities relate to a firm's ability to attract, retain, and manage talent effectively. Organizational capabilities refer to a firm's ability to design and implement effective organizational structures, processes, and systems. Finally, execution capabilities refer to a firm's ability to execute plans and strategies effectively. In the following sections, we provide detailed explanations of each capability examined.

2.2.2 Network capabilities

New Technology-Based Firms (NTBFs) face unique challenges due to their limited resources and distinct characteristics compared to established firms (DEVIGNE et al., 2013; FENG et al., 2019; MCGRATH; MEDLIN; O'TOOLE, 2019). In high-tech industries where NTBFs operate, success is no longer determined solely by how well firms develop, manage, and deploy their own resources to build competitive advantages. Rather, it is also dependent on how effectively they construct and coordinate a network of partners and resources (RAMPERSAD; QUESTER;

TROSHANI, 2010). In such contexts, resources and infrastructure are dispersed among various actors within the ecosystem (MÖLLER; SVAHN, 2009; NORDIN et al., 2018), making it essential for NTBFs to develop and nurture relationships with other organizations to survive and thrive. While some resources can be developed within the firm, other crucial resources may only be available outside the firm (EVELEENS; RIJNSOEVER; NIESTEN, 2017). Therefore, to overcome the limitations of resource scarcity, NTBFs must develop strong networks of partners to access the necessary resources (MCGRATH; MEDLIN; O'TOOLE, 2019).

Strategic alliances are a critical means of providing access to markets, capital, and other types of external resources, such as knowledge and capabilities. They are also useful tools through which firms can share risks with each other (BLEVINS; RAGOZZINO, 2018; EISENHARDT; SCHOONHOVEN, 1996). However, to capitalize on these networks, NTBFs need to develop networking capabilities – which are not naturally endowed in these firms (MCGRATH; MEDLIN; O'TOOLE, 2019) – to manage multiple relationships and ensure high performance (BAUM; CALABRESE; SILVERMAN, 2000; PARIDA et al., 2017). According to Walter et al. (2006, p. 546), networking capabilities refer to the "ability to initiate, maintain, and utilize relationships with various external partners". This view aligns with the resource and capability-based view (RBV), which suggests that "strategic networks" or "value nets" are intentionally constructed and that a specific set of organizations performs agreed-upon roles (NORDIN et al., 2018).

Therefore, networking capabilities can be critical factors in the innovation process and ultimately the success of NTBFs. For example, research has shown that firms with higher levels of networking capabilities tend to have better access to market intelligence from collaborating partners than those with lower levels of networking capabilities. Higher levels of networking capabilities may facilitate the generation, dissemination, and response to market intelligence. Consequently, the higher the networking capability, the greater the likelihood that firms can develop new products or solutions that are consistent with the insights obtained from the market (MU et al., 2017).

2.2.3 Marketing capabilities

Marketing capabilities refer to the experiential knowledge, skills, and processes that firms use to undertake effective marketing activities (AHMADI; O'CASS; MILES, 2014). These capabilities enable firms to leverage their superior market knowledge to generate economic gains (MORGAN; VORHIES; MASON, 2009). As entrepreneurs process and utilize their market knowledge, it becomes embedded in organizational routines that form the basis for marketing capabilities. By repeatedly using these routines to deliver valued outcomes, firms can develop their marketing capabilities (DAY, 1994; VORHIES; MORGAN, 2005). Thus, possessing market knowledge is essential for superior performance, but it is not sufficient without the ability to deploy that knowledge effectively (VORHIES; ORR; BUSH, 2011). Marketing capabilities are what enable NTBFs to achieve differentiation, cost-efficiency (AHMADI; O'CASS; MILES, 2014; SLOTEGRAAF; MOORMAN; INMAN, 2003), and a superior value proposition for their customers by effectively utilizing marketing resources such as budget and market knowledge (NGO; O'CASS, 2012).

Research within the marketing and entrepreneurship literature provides abundant evidence that marketing capabilities are crucial drivers of firm performance, and they represent a key mechanism for creating and sustaining competitive advantage (AHMADI; O'CASS; MILES, 2014; GLIGA; EVERS, 2023; KOZLENKOVA; SAMAHA; PALMATIER, 2014; VORHIES; ORR; BUSH, 2011). They are highly difficult to imitate due to their tacit and embedded nature, and they evolve within an organization, creating idiosyncratic path dependencies that make imitation less likely (TEECE; PISANO; SHUEN, 1997; VORHIES; ORR; BUSH, 2011). Furthermore, marketing capabilities serve as a signal of quality for venture capitalists and other investors, improving the valuation of NTBFs. To evaluate a firm's marketing capabilities, capitalists and researchers often use the number of trademarks as a proxy (e.g., ARORA; NANDKUMAR, 2011; ZHOU et al., 2016).

Despite the importance of marketing capabilities for innovation and financial performance and the growing body of research in this field, they remain a "black box" in both marketing and entrepreneurship literature, as little is known about how they are developed. Even though NTBFs usually face resource constraints, they require marketing resources as much as or more than their larger counterparts to develop marketing capabilities and gain a competitive advantage (CARSON; O'CONNOR;

SIMMONS, 2020; GLIGA; EVERS, 2023). Weak marketing capabilities have been identified as one of the main reasons for new venture failure (HOMBURG et al., 2014), underscoring their significance for firm performance.

2.2.4 Technological capabilities

Technological capabilities encompass a firm's experiential knowledge, skills, and related processes for designing, developing, and manufacturing new products or services (AHMADI; O'CASS; MILES, 2014; ZHOU; WU, 2010). These capabilities comprise both human and organizational components. The human capital aspect consists of specialist professionals, knowledge bases, and skills that are formally and informally allocated within the firm. On the other hand, the organizational aspect comprises routines, procedures, and managerial systems that support the development and manufacturing of new products or services (PEERALLY et al., 2022). Therefore, technological capabilities are indicative of a firm's ability to apply scientific and technical knowledge to develop new technology or products (GARCÍA-CABRERA; GARCÍA-SOTO; OLIVARES-MESA, 2019; SEARS; HITT, 2023). Commonly, patents and R&D investments are proxies used to measure these capabilities (JENSEN; LÖÖF; STEPHAN, 2020; KIM; PARK, 2017).

According to the capability-based view (CBV), technological capabilities are at the core of NTBFs (DELIGIANNI et al., 2019; LEE; LEE; PENNINGS, 2001), as they facilitate the deployment of distinct and superior technology and equipment, promoting innovation development within these firms. While it is widely accepted, although not always an absolute truth, that well-developed technological capabilities can reflect well-developed innovation capabilities (WANG; JIN; ZHOU, 2023), it is essential to recognize that technological capabilities and innovative capabilities are distinct concepts, despite their close relationship (IGEL; ISLAM, 2001; JENSEN; LÖÖF; STEPHAN, 2020).

Some researchers have conflated the two concepts and erroneously used the same metrics to assess these distinct constructs (see JINZHI; CARRICK, 2019; LIN et al., 2011; ZHENG; LIU; GEORGE, 2010). Innovation processes require both technical and marketing skills and resources (OECD/EUROSTAT, 2018), and thus, technological and innovation capabilities are not interchangeable. It is essential to distinguish between technological and innovative capabilities, recognizing the unique contributions each makes to the success of an NTBF.

Furthermore, there is compelling evidence that the success of innovation in NTBFs depends on the combination of marketing and technological resources and capabilities (see AHMADI; O'CASS; MILES, 2014; ARORA; NANDKUMAR, 2012; BUENSTORF, 2007; CLARYSSE; BRUNEEL; WRIGHT, 2011). NTBFs that possess superior marketing and technological capabilities can exploit them in various ways. For example, they can develop and license their technology to other firms that have better production systems or use their capabilities to compete in the product market (ARORA; NANDKUMAR, 2012). Moreover, H. Zhou et al. (2016) suggest that NTBFs with both marketing and technological capabilities are more likely to secure higher levels of venture capital.

Nevertheless, there are many controversies surrounding the importance of technological capabilities for NTBF performance. While some researchers suggest that technological capabilities, and the technical knowledge that underpins them, are more likely to be inimitable and difficult to replicate, providing NTBFs with sustainable competitive advantages over their competitors (e.g., MINOLA; HAHN; CASSIA, 2021), others have downplayed their significance for NTBF performance (e.g., JIANG; MURMANN, 2022; TEIXEIRA et al., 2021a).

Our research aligns with a third perspective that emphasizes the importance of a firm's growth strategy (GARCÍA-CABRERA; GARCÍA-SOTO; OLIVARES-MESA, 2019). This viewpoint suggests that the strategic positions adopted by NTBFs shape their actions, and the importance of technological development may vary depending on the chosen strategic direction. As a result, we argue that the need for well-developed technological capabilities hinges on the strategic decisions of NTBFs.

For example, a firm's business strategy clarifies its choices regarding being a technological pioneer or follower. This decision, in turn, affects other factors such as the level of investment in internal R&D and the emphasis on incremental and radical R&D. Ultimately, these decisions imply that NTBFs must develop capabilities beyond technological, including networking and financial capabilities (GARCÍA-CABRERA; GARCÍA-SOTO; OLIVARES-MESA, 2019; ZAHRA, 1996). This finding underscores the critical role of combining technological capabilities with other key capabilities, taking into account the business strategy, to achieve the desired outcomes for NTBFs.

2.2.5 Innovation capabilities

In contrast to technological capabilities, innovation capabilities refer to the ability to "create and commercialize innovative product, service, or process technologies that strengthen current business, enable new business ventures, and explore new technology bases" (IGEL; ISLAM, 2001, p. 160). These capabilities encompass the culture, values, leadership, processes, psychological factors, and skills of individuals (SKARZYNSKI; GIBSON, 2008). However, innovation capability is not solely a function of human abilities, as it also requires considerable support, infrastructure, and guidance from the organization (BANSAL et al., 2023; RAJAPATHIRANA; HUI, 2018). Thus, to develop innovation capabilities within NTBFs, entrepreneurs must address these factors as a set of interacting elements that work simultaneously (ROBB et al., 2022).

Innovation capabilities are seen as crucial ordinary capabilities in new technology-based firms (NTBFs) and serve as the foundation for maintaining competitive advantages in dynamic environments (MARION; DUNLAP; FRIAR, 2012; ZHOU; MAVONDO; SAUNDERS, 2019). Innovation capabilities allow firms to continuously develop new innovations, respond quickly to changing market conditions by introducing new products or solutions, and adopt new systems or processes to remain competitive. These capabilities encompass all the strategies, systems, and structures that support innovation within organizations (RAJAPATHIRANA; HUI, 2018), enabling entrepreneurial ventures to integrate market and technology resources and create innovative value offerings ahead of competitors (CARAYANNIS; SAMANTA ROY, 2000). Therefore, innovation capabilities are an integral part of a firm's main processes and cannot be considered in isolation from other capabilities (RAJAPATHIRANA; HUI, 2018).

Moreover, innovation capabilities play a crucial role in supporting the development and management of various firm capabilities, integrating them and facilitating the innovation process (LAWSON; SAMSON, 2001). For instance, Zhang et al. (2015) found that innovation, marketing, and networking capabilities work together to build brand equity. Marketing and networking capabilities build brand equity directly and indirectly via value co-creation and customer value, while innovation capability positively impacts brand equity indirectly by facilitating value co-creation and improving customer value.

Furthermore, given that the innovation process is resource-intensive, NTBFs often need to rely on their network capabilities to access external resources and competencies from partners. Network capability plays a critical role in strengthening innovation capabilities and supporting internal efforts to explore new markets and technological ideas, which can translate into improved firm performance (PARIDA et al., 2017). Previous research has consistently found that well-developed innovation capabilities can lead to high levels of NTBF performance (e.g. PARIDA et al., 2017; ZHENG; LIU; GEORGE, 2010), ultimately enabling these firms to achieve exceptional growth rates (DEMIR; WENNBERG; MCKELVIE, 2017).

2.2.6 Human Resource Management (HRM) Capabilities

One of the most pressing challenges faced by growing new ventures is the urgent need to recruit new employees within a limited timeframe (DEMIR; WENNBERG; MCKELVIE, 2017). To attract and retain top talent, these firms must establish effective human resource management (HRM) practices that focus on acquiring, developing, and motivating employees (POSTHUMA et al., 2013). Although HRM practices facilitate growth, they also present considerable obstacles, as innovative ventures often lack the readiness and resources to execute them effectively (DEMIR; WENNBERG; MCKELVIE, 2017; HAMBRICK; CROZIER, 1985).

To overcome this challenge, growing new ventures must transform their HRM practices into well-established routines that shape their HRM capabilities. HRM capabilities refer to a strategic and planned pattern of human resource deployments and activities designed to help an organization achieve its goals (WRIGHT; MCMAHAN, 1992). These capabilities involve the ability to efficiently conduct recruitment, selection, and training and development procedures. Furthermore, they enable firms to establish performance appraisal programs, promotions, and incentive compensation systems that recognize and reward employee merit (DEMIR; WENNBERG; MCKELVIE, 2017; HUSELID, 1995).

On one hand, effective employee selection practices allow high-growth firms to implement comprehensive search and selection methods. These methods, when combined with superior job and corporate orientation and onboarding processes for new hires, result in the engagement of top talent and ensure the transmission of the company's culture or ideology to new recruits (DEMIR; WENNBERG; MCKELVIE, 2017; HAMBRICK; CROZIER, 1985). On the other hand, employee training practices enable firms to develop sophisticated capabilities that are difficult for competitors to acquire and assimilate. Consequently, employee training practices are crucial for fostering growth and competitiveness within high-performance organizations (BARBERO; CASILLAS; FELDMAN, 2011; BARRINGER; JONES; NEUBAUM, 2005; DEMIR; WENNBERG; MCKELVIE, 2017). Moreover, employee compensation practices are vital for growing firms, as they help retain highly skilled employees who are often pushed to their limits, working extensive hours (DEMIR; WENNBERG; MCKELVIE, 2017; FISCHER et al., 1998; HAMBRICK; CROZIER, 1985).

Given their inherent nature, human resource management (HRM) capabilities are intrinsically linked to a firm's performance (VIITALA; VESALAINEN; UOTILA, 2022). The core rationale behind this connection is that various HRM practices, such as selection, training, and compensation, directly influence HRM outcomes, including commitment, quality, and flexibility. Additionally, these practices impact behavioral outcomes, such as employee engagement, motivation, and involvement, which subsequently promote operational outcomes like innovation, quality, and customer satisfaction. Ultimately, this leads to financial outcomes, such as increased productivity, profit, and return on investment (GUEST, 1997; VIITALA; VESALAINEN; UOTILA, 2022).

Numerous empirical studies have demonstrated the positive impact of HRM capabilities on a firm's performance (CARLSON; UPTON; SEAMAN, 2006; e.g., FINEGOLD; FRENKEL, 2006; HO; WILSON; CHEN, 2010; HUSELID, 1995; JIANG; TAKEUCHI; LEPAK, 2013). In fact, Combs et al. (2006) suggest that HRM practices can account for approximately 20% of the variance in performance between organizations. However, despite the potential of HRM capabilities, only a small fraction of firms manage to develop these capabilities effectively (VIITALA; VESALAINEN; UOTILA, 2022).

2.2.7 Financial Capabilities

Financial capital is one of the most critical resources that enable New Technology-Based Firms (NTBFs) to survive and thrive. Due to the inherent liabilities associated with their smallness and newness, such as the high risk tied to their business models and the absence of an established billing history, NTBFs typically have limited financing options. These options generally include support from friends, family, and inexperienced investors (often referred to as "fools"), as well as angel investors, venture capitalists, and seed funding (PASCHEN, 2017). In fact, financing challenges are among the primary obstacles to NTBFs' growth (BRINCKMANN; SALOMO; GEMUENDEN, 2011).

However, financial resources are not only crucial for the performance and growth of NTBFs, but also for their innovation activities. Highly innovative firms, such as NTBFs, necessitate considerable financing to sustain the essential human and technological resources for their innovative pursuits (BARBERO; CASILLAS; FELDMAN, 2011; FREEL; ROBSON, 2004). Furthermore, financial resources play an integral role in operational activities. NTBFs with sufficient capital can meet their financial obligations promptly and effectively execute operational tasks (ULLAH; ANWAR; KHATTAK, 2021).

In addition, adequate financial resources enable NTBFs to design and implement successful business strategies and processes. As such, financial resources serve as a critical component in obtaining and organizing other resources (BRINCKMANN; SALOMO; GEMUENDEN, 2011). A robust financial foundation thus allows NTBFs to proficiently conduct operational activities, develop innovative solutions, and formulate competitive business strategies, ultimately leading to improved competitive positioning and heightened levels of performance and growth (BARBERO; CASILLAS; FELDMAN, 2011; ULLAH; ANWAR; KHATTAK, 2021).

Considering the importance of financial resources for NTBFs and the complexities of obtaining and leveraging these resources due to their unique business nature, the development of financial management capabilities – henceforth referred to as financial capabilities – is an essential precondition for their success. Financial capabilities encompass the “ability to plan, manage, control, and direct financial resources effectively and efficiently” (NGUYEN, 2022, p. 3325). Consequently, these capabilities empower NTBFs to acquire financial resources and ensure their optimal utilization (BRINCKMANN; SALOMO; GEMUENDEN, 2011).

To accomplish their objectives, NTBF entrepreneurs may utilize internal and external financing strategies for their businesses. However, internal financing approaches often prove insufficient to sustain their operations and promote rapid growth. High-growth NTBFs generally need to depend on external financing, including bank loans or equity financing (e.g., venture capital or seed funding) (BRINCKMANN;

SALOMO; GEMUENDEN, 2011; CARPENTER; PETERSEN, 2002; CASSAR, 2004). Nevertheless, NTBFs frequently exhibit limited financial capabilities to manage their businesses' financial aspects, leading to numerous inefficiencies in operational and strategic areas, such as cash flow liabilities (BARBERO; CASILLAS; FELDMAN, 2011; BRINCKMANN; SALOMO; GEMUENDEN, 2011). As a result, the lack of financial capabilities constitutes one of the primary barriers to the performance and growth of NTBFs (BARBERO; CASILLAS; FELDMAN, 2011).

2.2.8 Organizational Capabilities

Building upon the research of Barbero et al. (2011), we define organizational capabilities as the ability to effectively plan, coordinate activities, allocate resources efficiently, manage information, and monitor activities. These capabilities include the capacity to establish an appropriate organizational structure, delegate tasks effectively, align the organization's culture with the firm's interests, establish and communicate firm objectives, and more.

Organizational capabilities are widely recognized as crucial for the success of small businesses (SAPIENZA et al., 2006; ZAHRA; IRELAND; HITT, 2000), as organizational factors and inadequate planning often hinder optimal business performance (BARBERO; CASILLAS; FELDMAN, 2011). This is particularly true for new technology-based firms (NTBFs), for which robust structures, processes, and discipline are necessary to support and sustain their rapid growth (OLIVA et al., 2019; PICKEN, 2017). Innovative processes require a higher level of organizational capabilities, such as long-term planning, appropriate allocation and distribution of resources, and coordination of the firm's activities to ensure successful innovation outcomes, especially in resource-scarce contexts (BARBERO; CASILLAS; FELDMAN, 2011).

Moreover, organizational capabilities appear to have complementary effects when combined with other capabilities, such as human resource management (HRM) capabilities. For instance, NTBFs should not only adopt a more horizontal and organic structure with flexible systems that facilitate rapid apprehension and adaptation in the face of change but also possess the ability to attract, motivate, and retain committed individuals who collaborate to achieve organizational objectives. Consequently, the impact of organizational capabilities on NTBF performance should not rely solely on these capabilities but also on their integration with HRM and other competencies (OLIVA et al., 2019).

2.2.9 Execution Capabilities

Great strategies don't guarantee great performance. Despite a considerable amount of time and energy is invested in strategy development, yet many firms struggle to achieve significant results (BHIDE, 1996). Many young firms fail due to their teams' inability to execute the established plans. In fact, on average, firms are expected to deliver merely 63% of the financial performance their strategies promise (MANKINS; STEELE, 2005). Several factors contribute to this discrepancy, such as a venture's failure to hire top talent, secure capital, invest in organizational infrastructure, and cultivate a culture that aligns with its strategy (BHIDE, 1996). Consequently, the key to mitigating these challenges lies in developing strong execution capabilities.

Execution capabilities, though widely acknowledged as a critical success factor in the practitioner domain, have received limited attention and discussion in the academic sphere regarding their nature and importance for the performance of NTBFs. Despite the emergent nature of this subject, there is some consensus that execution capabilities refer to the abilities of implementing and monitoring a well-defined plan (YANG; SUN; ZHAO, 2019). These capabilities comprise a collection of specialized practices refined through consistent practice and cumulative effort across a diverse range of activities or projects, enabling firms to allocate resources effectively (MISHRA; SINHA; THIRUMALAI, 2017). As a result, higher execution capabilities can be developed by combining prior experience in undertaking related activities and leveraging management practices knowledge to manage and utilize organizational resources efficiently (CABRAL, 2017).

Given the nature of execution capabilities, they play a significant role as an antecedent of NTBF performance. Recent research indicates that, in order to prosper in challenging environments, NTBFs must not only generate innovative ideas to differentiate their products but also effectively execute these ideas to generate profits (LEE, 2022). A firm with well-developed execution capabilities should possess a better understanding of the market, apply prior experiences to daily operations, and make relatively accurate predictions. Consequently, execution has become a primary activity in modern organizations (YANG; SUN; ZHAO, 2019).

Nevertheless, execution capabilities alone cannot guarantee exceptional performance. To achieve outstanding outcomes, execution capabilities should rely on both the firm's "hard" infrastructure (e.g., organizational structure and systems) and its "soft" infrastructure (e.g., firm culture and norms) (BHIDE, 1996). As a result, the success of execution capabilities also depends on other firm capabilities, such as the HRM capabilities. For instance, without an appropriate and systematic method for coordinating personnel, managers may become overwhelmed with directing and resolving conflicts. This can result in the operational team engaging in power struggles and aimless exploration of ideas, ultimately leading to significant employee turnover (LEE, 2022). Therefore, although execution capabilities can positively impact NTBF performance, it is assumed that, like other capabilities, they cannot provide the expected performance outcomes on their own.

2.2.10 Research gaps in the role of capabilities for firm performance

Collectively, the evidence from our literature review indicates that, despite the substantial emphasis on the importance of firm capabilities for the performance of NTBFs, there are two primary gaps in this field. Firstly, another significant gap involves understanding how ordinary capabilities emerge and develop. While these capabilities have long been linked to the performance of young high-tech firms, little is known about how they originate (MCGRATH; MEDLIN; O'TOOLE, 2019). To elucidate this process, most studies have investigated the impact of internal assets (e.g. BUENSTORF; HEINISCH, 2020; COLOMBO; GRILLI, 2005). For instance, the role of learning mechanisms, such as knowledge articulation and codification (ZOLLO; WINTER, 2002), trial and error, improvisation, imitation (ZAHRA; SAPIENZA; DAVIDSSON, 2006) and collective learning (LINDEN; BITENCOURT; MULLER NETO, 2019) has been extensively explored. In contrast, external factors have largely been overlooked (see BENSON; ZIEDONIS, 2009; ROUNDY; FAYARD, 2019).

Secondly, as previously mentioned, the performance implications of different types of capabilities have not been adequately investigated (DASPIT; D'SOUZA, 2017), particularly in the NTBF context. Additionally, most studies have concentrated on examining individual capabilities independently (MCGRATH; MEDLIN; O'TOOLE, 2019; NORDIN et al., 2018), disregarding the complementary nature of ordinary capabilities.

While individual firm capabilities are crucial, they alone are insufficient to maintain a competitive advantage (EISENHARDT; MARTIN, 2000). This suggests that a primary capability must be combined with other firm capabilities to establish a unique composition that generates a competitive edge (ATUAHENE-GIMA; LI; DE LUCA, 2006). Additionally, the development of new capabilities is partially explained by the presence of existing capabilities within the firm (JENSEN; CLAUSEN, 2017). As a result, NTBF success relies on multiple capabilities rather than just one (BURGER-HELMCHEN, 2009). For instance, Arora and Nandkumar (2012) found that marketing and technological capabilities have complementary effects on performance. Moreover, Parida et al. (2017) determined that network capability is more strongly associated with innovative capability than with performance. Despite this compelling evidence, an integrative model illustrating the entire system of ordinary capabilities has yet to be established. The subsequent section will address the importance of the external environment in this context.

2.3 BUILDING FIRM CAPABILITIES IN KNOWLEDGE ECOSYSTEMS: A KNOWLEDGE SPILLOVER THEORY PERSPECTIVE

The Knowledge Spillover Theory of Entrepreneurship (KSTE) elucidates the process and mechanisms by which NTBFs capitalize on opportunities using knowledge generated within established organizations such as URCs (ACS; AUDRETSCH; LEHMANN, 2013; GHIO et al., 2015; MINOLA; HAHN; CASSIA, 2021). KSTE aims to determine the impact of knowledge transfer on the performance of NTBFs. It posits that knowledge created but not commercialized by established organizations leads to underexploited opportunities, which subsequently give rise to entrepreneurial ventures and influence their future performance (JIANG; MURMANN, 2022; PLUMMER; ACS, 2014).

According to Acs et al. (2013), the KSTE is based on the fundamental notion that entrepreneurial activity emerges as a response to valuable opportunities that arise from knowledge spillovers. In essence, this theory posits that entrepreneurs are able to establish and pursue ventures because they have access to these knowledge spillovers, which serve as the bedrock for entrepreneurial opportunities.

However, while existing studies have identified a positive relationship between knowledge flows from incumbent organizations and NTBF performance, there is limited evidence on the actual knowledge transfer process within NTBFs. Specifically, a comprehensive understanding of the channels and mechanisms through which knowledge generated within established organizations is transferred, as well as their potentially distinct effects, remains elusive (JIANG; MURMANN, 2022).

2.3.1 URC Knowledge as a Catalyst for Competitive Advantage in NTBFs

In the era of knowledge-driven economies, enterprises must continually adapt and expand beyond their limited resources to survive and thrive (WANG; JIANG, 2019). In this context, knowledge emerges as the most valuable resource (MAALAOUI; LE LOARNE-LEMAIRE; RAZGALLAH, 2020) and is deemed critical for maintaining a competitive edge for firms (see, for example, CRUPI et al., 2020; MIOTTI; SACHWALD, 2003). As a result, the growing complexity, interdisciplinary nature, and fast pace of innovation processes have made knowledge an increasingly appealing asset for companies (VIVAS; BARGE-GIL, 2015).

To tackle these challenges, modern businesses have transformed into knowledge-intensive entities (CARLAW et al., 2006). Consequently, managers have become more focused on accessing external knowledge to maintain competitiveness and ensure positive organizational outcomes in recent decades (ALIASGHAR; SADEGHI; ROSE, 2020; AMARA; LANDRY, 2005; VIVAS; BARGE-GIL, 2015).

Successful businesses have established strategies to consistently source and incorporate valuable ideas from external knowledge providers, such as customers, suppliers, competitors, and universities and research centers (URCs) (CRUPI et al., 2020; LAURSEN; SALTER, 2006). Additionally, these companies have developed specialized capabilities to integrate newly acquired knowledge into their existing knowledge base (COHEN; LEVINTHAL, 1990). Thus, knowledge integration, rather than simply knowledge acquisition, has become a key element of sustainable competitive advantage. This shift has led firms to develop valuable capabilities (see CEPEDA; VERA, 2007; MAALAOUI; LE LOARNE-LEMAIRE; RAZGALLAH, 2020), enhance collaborative expertise and trust (BELLINI; PIROLI; PENNACCHIO, 2019), and ultimately improve overall performance (CRUPI et al., 2020).

This line of reasoning is especially pertinent for NTBFs (RASMUSSEN; WRIGHT, 2015), which are frequently regarded as knowledge-intensive businesses (KIBs) that exploit science and/or technology-based opportunities to offer innovative solutions (HOLMÉN; MAGNUSSON; MCKELVEY, 2007). Consequently, NTBF activities often rely heavily on specialized knowledge that may not be readily available internally, prompting these firms to seek external expertise from highly specialized sources, primarily URCs (MILLER et al., 2016; RASMUSSEN; WRIGHT, 2015; YAN, 2019). URCs have been described as the seedbeds of NTBFs (RASMUSSEN; WRIGHT, 2015), as they serve as crucial sources of knowledge and talent for NTBFs to tap into (YAN, 2019).

Moreover, scientific knowledge has been acknowledged for its unparalleled ability to foster and sustain radical innovations (ABBATE; CESARONI; PRESENZA, 2020). Therefore, analyzing how knowledge is transferred from URCs and subsequently assimilated and applied in NTBF activities is essential to understand NTBF survival and performance (KNOCKAERT; SPITHOVEN; CLARYSSE, 2014). Additionally, at the national level, URC knowledge transfer is perceived as a driving force for entrepreneurship and innovation, promoting local and regional development (SCUOTTO et al., 2020).

Over time, the role of universities and research centers (URCs) has evolved to adapt to the changing landscape of knowledge-driven economies. As economies worldwide become increasingly reliant on knowledge-intensive products and services (AUDRETSCH, 2014), the production, acquisition, absorption, reproduction, and dissemination of knowledge has become crucial for fostering innovation (AUDRETSCH; HÜLSBECK; LEHMANN, 2012). Consequently, URC-firm relationships have emerged as significant drivers of regional and global development (GARCIA-PEREZ-DE-LEMA; MADRID-GUIJARRO; MARTIN, 2017), given their roles as both generators and repositories of scientific and human knowledge, which then spills over into regional industries, particularly for innovative firms (AUDRETSCH; HÜLSBECK; LEHMANN, 2012; AUDRETSCH; LEHMANN; WRIGHT, 2014). These organizations produce a growing proportion of scientific inventions that serve as catalysts for technological advancements, boosting innovation and financial performance within entrepreneurial ventures (LEIH; TEECE, 2016; THOMAS et al., 2020).

The process of knowledge transfer from URCs is intricately connected to the three main functions of academic and scientific institutions (FUKUGAWA, 2013): (1) educating and supplying society with high-develeoped human resources, (2) engaging in basic research, and (3) serving as a knowledge source for firms facing R&D

challenges. For example, URCs often provide entrepreneurship courses and programs, as well as broad administrative and academic support for entrepreneurs (AUDRETSCH; LEHMANN; WRIGHT, 2014). Hence, knowledge transfer from URCs can occur through various channels, such as sponsored research, licensing, hiring students or researchers, adopting tacit knowledge, publishing, and more (MÜLLER, 2010). These spillovers not only improve the quality of R&D personnel (FUKUGAWA, 2013) but also promote the creation of new technology-based firms (NTBFs) (CALCAGNINI et al., 2016). This is particularly true for firms operating in knowledge-intensive industries that employ open search strategies and invest in R&D, such as the biotechnology sector (LAURSEN; SALTER, 2004). In the following section, we discuss the significance of external knowledge sources for NTBF development and explore how this resource is transferred from URCs and integrated into firms' knowledge bases.

2.3.2 Defining Knowledge Ecosystems

The external environment, encompassing actors, resources, and artifacts beyond the immediate control of New Technology-Based Firm (NTBF) managers, presents both challenges and opportunities (NGOASONG, 2018; OECD/EUROSTAT, 2018; YASIR; MAJID; YASIR, 2017). For instance, NTBFs operating in high-tech, dynamic environments may rapidly develop technology, but the value and impact of these resources can deteriorate quickly (LIN; LI, 2013). The institutional environment, linked to public policies, laws, and regulations, can either promote or restrict new business creation, intellectual property, and competition (NGOASONG, 2018). Consequently, business environments can either stimulate or hinder interactions between organizations, influencing the exchange of valuable resources, business performance, and capability development (KETATA; SOFKA; GRIMPE, 2015).

To understand NTBF performance, it is crucial to examine factors beyond the firms themselves (ATUAHENE-GIMA; LI, 2004; AUTIO; GEORGE; ALEXY, 2011; ROUNDY; FAYARD, 2019). The survival and growth of young technology firms depend heavily on the interplay between resource management and their competitive context (CLARYSSE; BRUNEEL; WRIGHT, 2011). This context may act as a trigger, encouraging entrepreneurial ventures to adopt different strategies or growth paths

(AUTIO; GEORGE; ALEXY, 2011; LIN; LI, 2013; YASIR; MAJID; YASIR, 2017), or as an enabler, pressuring firms to rely on external partners or organizations to acquire resources and develop capabilities (FAN; URS; HAMLIN, 2019; REYNOLDS; UYGUN, 2018). This is particularly relevant for firms in highly dynamic markets, where strategic and competitive advantages rely more on shared resources, network externalities, knowledge spillovers, local endowments, and governmental support (AUDRETSCH et al., 2019). With significant variation in entrepreneurial activities and regional endowments across and within countries and regions, recent studies advocate for examining entrepreneurship and innovation activities at the local level (see EPURE; PRIOR; SERAROLS, 2016; MICKIEWICZ et al., 2017; ROUNDY; FAYARD, 2019).

This perspective aligns with the knowledge ecosystem concept, emphasizing knowledge-enhancing activities such as knowledge sharing, development, and integration among parties, rather than focusing on business interactions of a limited number of parties organized around a specified knowledge search or practice (ÖBERG; LUNDBERG, 2022). In these hotspots, “local universities and public research organizations play a central role in advancing technological innovation” (CLARYSSE et al., 2014, p. 1164). Knowledge ecosystems can be viewed as geographically co-located hotspots comprising diverse actors collaboratively seeking valuable knowledge while maintaining independent agency beyond the ecosystem. They may be organized around specific technological or societal challenges, geographically co-located organizations in complementary fields, or purposefully established to address fundamental or applied science problems (JÄRVI; ALMPANOPOULOU; RITALA, 2018; RÅDBERG; LÖFSTEN, 2023).

The ecosystem perspective, originating from ecology science, represents material and energy flow between subsystems organized into process-oriented roles (GRANSTRAND; HOLGERSSON, 2020; SHAW; ALLEN, 2018). It primarily focuses on new models of value creation and capture by encompassing subjects like business models, platforms, coopetition, networks, technology systems, and value networks (ADNER, 2016). Numerous ecosystems have been developed worldwide, giving rise to many NTBFs and other businesses, generating new jobs, and increasing economic wealth. For example, in Barcelona, the knowledge economy within the ecosystem is acknowledged as a key industry, with almost a third of all companies and half of the labor force participating in it (MULAS; MINGES; APPLEBAUM, 2015). In Brazil, significant knowledge ecosystems can be found in Porto Alegre, São Paulo, and other cities.

Although knowledge ecosystems are widely acknowledged for their importance in wealth creation and business development, there remains a limited understanding of how knowledge spills over to NTBFs, assisting them in developing the firm capabilities necessary for survival and growth in competitive environments (see JIANG; MURMANN, 2022; ROUNDY; FAYARD, 2019). The mechanisms and processes through which knowledge ecosystems contribute to NTBFs' development and success, as well as the factors that may enhance or hinder knowledge and resource spillovers within these ecosystems, are not yet fully understood. In the following section, we will delve into the topic of knowledge transfer from URCs.

2.3.3 URC Knowledge Transfer

In this new context, novel ways of adding value have emerged, which have changed how knowledge is utilized and how organizations do businesses. Firms have employed fewer resources for internal R&D, betting on partnerships with URCs to develop their innovation initiatives (FINI et al., 2018). To understand this new trend, recent studies have addressed institutional, organizational, and individual determinants of knowledge transfer activities, which has led to the emergence of different research paradigms: university ecosystems (e.g., AUTIO et al., 2014), entrepreneurial universities (e.g., LEIH; TEECE, 2016; URBANO; GUERRERO, 2013), and academic entrepreneurship (e.g., KLOFSTEN; JONES-EVANS, 2000; SANSONE et al., 2021) are some examples of approaches which have revealed the multidimensional roots of university knowledge transfer (FINI et al., 2018).

Knowledge transfer itself can be described as “a process whereby a recipient accesses, learns and deploys knowledge that is communicated by a source via actions and interactions” (SPRAGGON; BODOLICA, 2020, p. 1422). Therefore, for knowledge transfer to effectively occur, it is necessary for the recipient to absorb and utilize the transferred knowledge (PARK; IM; KIM, 2011). The following is a non-comprehensive list of recognized university knowledge transfer channels (henceforth, KTCs) (see ALEXANDER; MARTIN, 2013; BECERRA; CODNER; MARTIN, 2019; FISCHER et al., 2021): patent licenses, student placement, spinoff development, R&D agreements, and HR training. These channels are detailed in the next section.

However, knowledge transfer is not always successful. Three important factors – properties of knowledge, relationship characteristics, and organizational context – could foster or hinder this process (see BACON; WILLIAMS; DAVIES, 2020; MILLER et al., 2016; SPRAGGON; BODOLICA, 2020). The first one is related to the 'explicitness' or 'tacitness' of knowledge to be transferred. This concept originates from the seminal work on organizational knowledge of Polanyi (1966), which discuss the fundamental distinction between explicit and tacit knowledge. Explicit knowledge is codified and expressed in formal language; therefore, it is easier to articulate, capture and distribute (EASTERBY-SMITH; PRIETO, 2008; NONAKA; TAKEUCHI, 1995). Tacit knowledge is intuitive and unarticulated, associated with personal skills and experience. Hence, it is more difficult to articulate and distribute (CRUPI et al., 2020; EASTERBY-SMITH; PRIETO, 2008).

Second, the relationship characteristics between URCs and firms are determinants of knowledge transfer. For example, given its attributes, explicit knowledge is usually transferred more readily through transactional channels (AL-SALTI; HACKNEY, 2011; BACON; WILLIAMS; DAVIES, 2020) whereas tacit knowledge is transferred more effectively in channels that are more relational in nature (ALEXANDER; MARTIN, 2013; PERKMANN; WALSH, 2008). Similarly, Spraggon and Bodolica (2020) state that structured (i.e., formal and planned in nature) knowledge transfer processes should be adopted to transfer explicit knowledge and unstructured (informal and spontaneous) processes to capture tacit knowledge. Additionally, the degree of trust and the strength of ties between partners is fundamental to the success of knowledge transfer. Effective knowledge transfer depends on mutual trust (NIDHRA et al., 2013) because it stimulates openness to communication and knowledge sharing (KHAMSEH; JOLLY, 2008), enhancing cooperative behavior (BACON; WILLIAMS; DAVIES, 2020). Stronger ties, in turn, encourage firms to share more detailed knowledge and to facilitate access to information, therefore favoring the exchange of high-quality knowledge (VAN WIJK; JANSEN; LYLES, 2008).

Third, as highlighted by Bacon et al. (2020), the extent to which URCs and firms maintain cultural congruency in terms of shared beliefs, values, and practices is positively related to the enhancement of knowledge transfer processes (MOWERY; OXLEY; SILVERMAN, 1996). Common vision and goals enable unique connections between organizations, encouraging them to become partners (VAN WIJK; JANSEN; LYLES, 2008). This view is closely connected to the proximity perspective, which appears to be fruitful to understand why and how much universities and firms interact. Proximity, in the innovation literature, denotes the extent to which partners are geographically, cognitively, organizationally, and socially close (BOSCHMA, 2005). For instance, partners that are cognitively proximate “perceive, interpret, understand, and evaluate the world in similar ways” (VILLANI; RASMUSSEN; GRIMALDI, 2017, p. 87). In this sense, there exists a common cognitive misalignment between URC scientists and business managers, which could hinder knowledge transfer because the former search for new knowledge and the latter for profit (FINI et al., 2018).

To summarize, university knowledge transfer is a complex process that depends on a set of circumstances to work properly. Additional complexity comes from the presence of single or multiple channels, simultaneous flow of information, and academic and scientific source institutions that firms must filter for relevance before deciding on a course of action. In the next section, we present these numerous ways of transferring knowledge.

2.3.4 Knowledge Transfer Channels

A lot of research has suggested that during URC-industry interactions, knowledge flows through multiple channels (see ALEXANDER; MARTIN, 2013; BARROS et al., 2020; BECERRA; CODNER; MARTIN, 2019; FINI et al., 2018; FRANCO; HAASE, 2015). In our study, we adopted the model of Becerra et al. (2019) to define the knowledge transfer channels which agtechs could rely on to acquire specialized knowledge from universities. This model offers a unique guide for understanding university knowledge transfer under the paradigm of open innovation, which NTBFs are deeply engaged (CHESBROUGH, 2003; SAVARESE; ORSI; BELUSSI, 2016). Becerra et al. (2019) identified sixteen knowledge transfer channels related to four core competences in universities. However, we previously verified that two of them – namely, joint R&D with public institutions and HR training for governmental sector – may not be related to agtechs. Therefore, we excluded them from our model. Table 1 shows the fourteen knowledge transfer channels considered in our preliminary model.

Set up and management of research projects (UCC1). As explained by Alexander and Martin (2013), the first core competence is related to universities’ ability to facilitate management activity between different stakeholders for research projects.

Identification of the type of project, price negotiation and closing agreements, and project follow-up are some examples of important activities associated with this competence. Three main knowledge transfer channels arise from this competence: R&D Contracts (CH01), through which universities develop R&D projects to find specific solutions that firms and other organizations can't deal with internally; Services and Consultancies (CH02) - generally through their research groups or laboratories, universities provide services and consultancies based on their specialized knowledge; and Joint R&D (CH03), situations in which universities and firms have complementary knowledge or other assets and decide to cooperate to discover new knowledge or to propose solutions to problems.

Table 1 – University core competences (UCCs) and knowledge transfer channels

UCCs	**Channel**	**Channel Description**
1. Set up and management of research projects	CH01 - R&D contracts	A company contracts with an R&D project to search for a specific solution.
	CH02 - Services and consultancies	A company hires services and consultancies from universities.
	CH03 - Joint R&D	Commercial and academic partners agree to work together to discover new knowledge or to propose solutions solving a problem.
2. Knowledge sharing and support services to enterprises	CH04 - Technology Transfer Facilities	Provision of services or access to equipment, laboratories, or other facilities.
	CH05 - HR Training	Commercial partners keep their professional knowledge up to date with new developments through continuing education.
	CH06 - Joint publications	Academics and professionals develop papers together for professional journals.
	CH07 - Co-direction of Theses	Academics and industrialists come together to supervise research initiatives.
3. Boundary spanning through HR	CH08 - Student placement	Transfer of a graduate into a company partner
	CH09 -Researchers/Fellows in company	Member of staff is present for a period in another organization.
	CH10 - Joint conference	Audience of company employees and academics and speakers are taken from both groups
	CH11 - Networks	Groups of professionals and/or academics come together and meet face-to-face under a banner of common interest or subject discipline
4. Patents and entrepreneurship	CH12 - Licensing of Intellectual Property	A particular piece of knowledge or know-how is protected by either an academic partner or a commercial partner
	CH13 - Startup development	Universities offer a developmental program to support startup emergence.
	CH14 - Spin-off development	Universities offer a developmental program to support spin-off emergence.

Source: Adapted from Alexander and Martin (2013) and Becerra et al. (2019).

Knowledge sharing and support services to enterprises (UCC2). The second competence is the ability to promote and develop knowledge-based support services, in order to share best practices with organizations outside the university setting (ALEXANDER; MARTIN, 2013). Related to this competence, there are four KTCs: Technology Transfer Facilities (CH04), which can be understood as services or access to equipment, laboratories, or other facilities that help firms to build prototypes or develop products (GUSTON, 1999), among others; HR Training (CH05), i.e. the provision of courses or programs to continue the professional development of staff (DEBACKERE; VEUGELERS, 2005); Joint Publications (CH06), by which researchers and entrepreneurs engage in scientific publications; Co-direction of Theses (CH07), an arrangement through which researchers and practitioners agree to supervise together a piece of research, understanding that such project can be improved or even depends on knowledge or other assets from both sides.

Boundary spanning through HR (UCC3). This competence is associated with the university capacity to disseminate knowledge and expand its activities beyond the academic setting through effective mobilization of human resources (ALEXANDER; MARTIN, 2013). This ability is deeply embedded in the socialization (the creation of “tacit knowledge through shared experience”) and externalization (the conversion of “tacit knowledge into explicit knowledge”) processes (NONAKA, 1994, p. 19). Four channels are associated with this competence: Student Placement (CH08), i.e., university programs or services to support students searching for extended internships or work experience to complement or earn their degree; Researchers or Fellows at Companies (CH09), i.e., agreements to place experienced researchers in companies to develop specific activities or projects for a defined period; Joint Conference (CH10), a meeting of practitioners, academics, and speakers to exchange knowledge within this group; and Networks (CH11), by which groups of practitioners and/or academics come together to carry out activities and projects of common interest.

Patent and entrepreneurship (UCC4). This competence is related to the university ability to transfer intellectual property (IP) from the academic setting to the practical world and to facilitate entrepreneurial activity (ALEXANDER; MARTIN, 2013). Three KTCs are associated with this competence: Licensing of Intellectual Property (CH12), by which universities permit individuals or businesses to use a piece of knowledge or know-how (intellectual property rights) in exchange for a fee or other benefit defined in trade agreements; Startup Development (CH13), initiatives or programs to support the creation and development of high-technology new ventures founded by entrepreneurs not directly related to the academic setting or by university graduates (or even students); Spinoff Development (CH14), initiatives or programs to support the creation and development of new technology ventures founded by researchers or research groups who intend to leverage their R&D results for commercial use. Fryges and Wright (2014) further detail the differences between startups and spinoffs which are characterized by these last two KTCs.

2.4 RESEARCH MODEL AND PROPOSITIONS

In summary, our literature review led us to develop three key propositions. Firstly, although numerous new technology-based firms (NTBFs) have emerged, only a select few have achieved exceptional performance. By examining this phenomenon through the Resource-Based View lens, we can understand that NTBF performance is a complex phenomenon contingent on various organizational and operational resources, such as firm capabilities. In particular, one resource has been shown to be especially significant for NTBF performance: ordinary capabilities. These resources are utilized in operational activities (RAZMDOOST; ALINAGHIAN; LINDER, 2020; WANG; AHMED, 2007; ZOLLO; WINTER, 2002), enabling firms to "make a living" or "[do] things right" within core business functions (TEECE, 2014; WINTER, 2003). Consequently, they are closely related to firm performance (TEECE, 2014).

Despite the considerable emphasis on the importance of ordinary capabilities for NTBF performance, the performance implications of various types of capabilities considered together (e.g., innovation, marketing, and/or technological capabilities) have not been sufficiently explored (DASPIT; D'SOUZA, 2017), particularly within the NTBF context. Previous research has been limited in its ability to explain NTBF performance due to narrow methodological approaches that primarily focus on examining how individual resources contribute to firm performance (MCGRATH; MEDLIN; O'TOOLE, 2019; NORDIN et al., 2018), overlooking the fact that NTBF performance should be explained by a combination of multiple capabilities, rather than a single one (EISENHARDT; MARTIN, 2000). This reasoning led us to develop our first proposition:

Proposition 1 (P1): The presence of a single ordinary capability in isolation should not be considered sufficient for achieving high levels of performance in NTBFs.

Secondly, given that NTBFs can choose various business trajectories based on the specificities of their context, they should also adopt diverse business strategies (HAMANN et al., 2013; OLIVA et al., 2019). Consequently, it is reasonable to assume that distinct portfolios or combinations of capabilities are necessary to address the unique challenges NTBFs encounter in different contexts. If this assumption holds true, it is also plausible to posit that multiple configurations of capabilities can be equally effective in promoting the achievement of high levels of NTBF performance (GARCÍA-CABRERA; GARCÍA-SOTO; OLIVARES-MESA, 2019), as long as each set of capabilities optimizes the outcomes of NTBFs in their respective contexts. This line of reasoning led us to develop our second proposition:

Proposition 2 (P2): The performance of NTBFs should be explained by multiple configurations of ordinary capabilities, which can be equally effective within their respective contexts.

Thirdly, although these capabilities have long been associated with the performance of young high-tech firms, there is limited understanding of their origins (MCGRATH; MEDLIN; O'TOOLE, 2019). As previously mentioned, capabilities develop through an extended process of knowledge accumulation (CALOGHIROU; KASTELLI; TSAKANIKAS, 2004), a resource that is often scarce in NTBFs. In response to this challenge and in their pursuit of sustained competitiveness, NTBF managers have increasingly focused on accessing external knowledge (ALIASGHAR; SADEGHI; ROSE, 2020; AMARA; LANDRY, 2005; VIVAS; BARGE-GIL, 2015), primarily from universities and research centers (URCs) (MILLER et al., 2016; RASMUSSEN; WRIGHT, 2015; YAN, 2019).

Hence, it is essential to recognize that the transfer of knowledge from URCs does not exert a direct influence on NTBF performance; rather, it follows an indirect trajectory. The knowledge conveyed from URCs assumes a critical role in assisting NTBFs in developing the ordinary capabilities essential for enhancing operational efficiency and, consequently, overall performance. Consequently, it is plausible that the impact of knowledge transfer on NTBF performance follows this indirect path, primarily through the development of these ordinary capabilities.

For instance, the transfer of knowledge from URCs directly influences specific aspects, such as the enhancement of human capital within NTBFs. This, in turn, significantly augments their innovation capabilities (GARCÍA-CABRERA; GARCÍA-SOTO; NIEVES, 2021), enabling these enterprises to effectively leverage knowledge for seizing opportunities, a concept substantiated by numerous studies (e.g., ACS; AUDRETSCH; LEHMANN, 2013; FELDMAN; OZCAN; REICHSTEIN, 2019; JIANG; MURMANN, 2022). Furthermore, a substantial body of research indicates that URC knowledge transfer positively impacts the development of technological capabilities in NTBFs (e.g., KRUGER; STEYN, 2020; WANG; JIANG, 2019). This enhancement of technological capabilities can, in turn, translate into elevated performance levels for these firms.

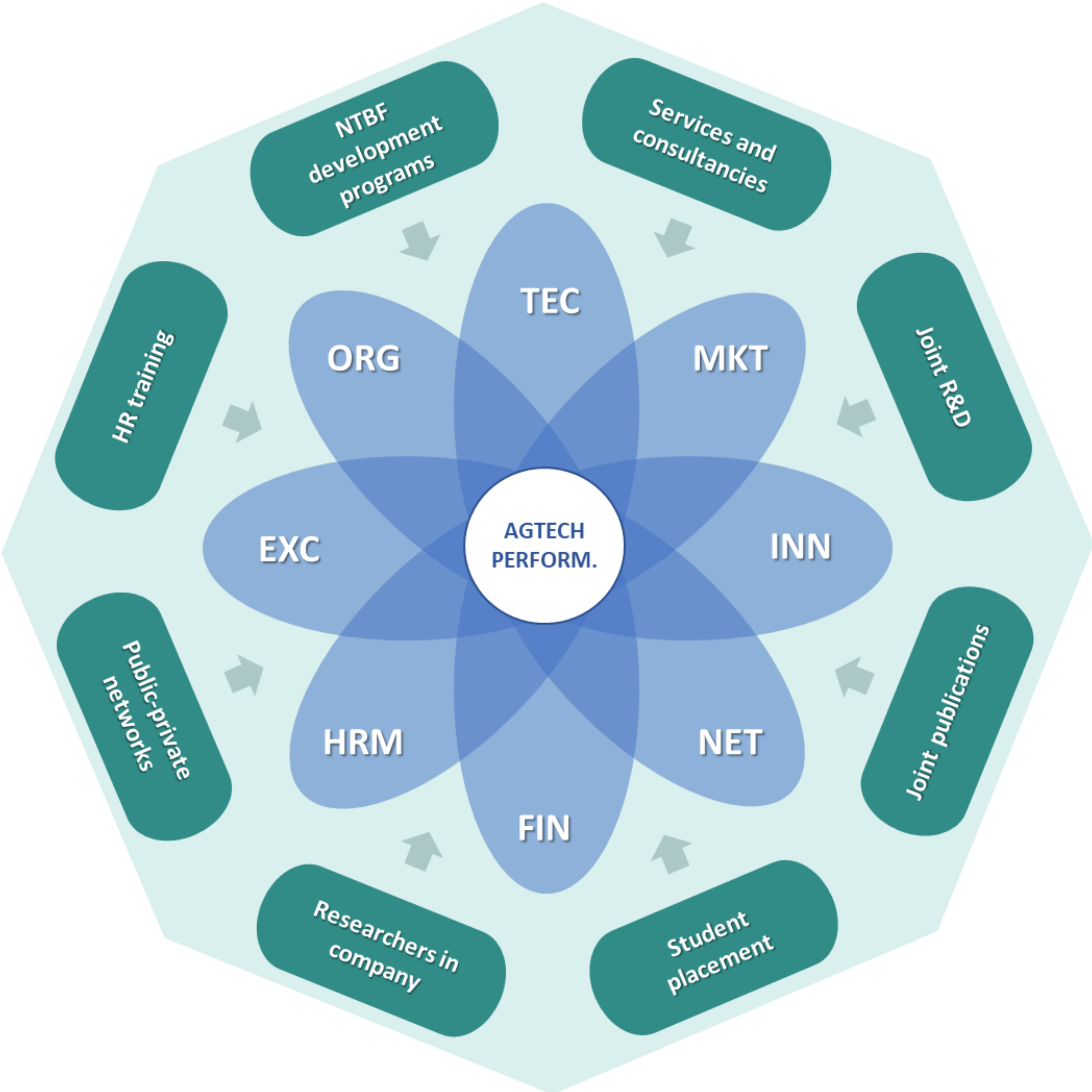
Therefore, while knowledge ecosystems are widely acknowledged for their significance as sources of specialized knowledge, and this knowledge indirectly contributes to favorable NTBF performance, there remains a limited understanding of how knowledge is effectively transferred to NTBFs to aid in the development of the ordinary capabilities necessary for survival in competitive environments (see JIANG; MURMANN, 2022; ROUNDY; FAYARD, 2019). Given that knowledge transfer should occur through multiple channels, and entrepreneurial activities are highly contingent on their respective contexts (KRUGER; STEYN, 2020; MARR; PHAN, 2020), it is reasonable to anticipate that different knowledge transfer channels will yield varying outcomes in terms of capability development within each distinct context. This rationale led us to formulate our third proposition:

Proposition 3 (P3): Knowledge transfer channels produce different outcomes in terms of capability development across various contexts.

Collectively, these three propositions underscore the pivotal role played by URCs in transferring specialized knowledge to NTBFs through a range of knowledge transfer mechanisms. This specialized knowledge, in turn, stimulates the development of advanced ordinary capabilities at the firm level. When these capabilities are thoughtfully configured to align with the specific business context of NTBFs, they create an optimal environment for the firm to achieve heightened levels of performance.

Taking into account the research opportunities presented in this section, we propose the creation of an integrated system of ordinary capabilities that elucidates how knowledge transferred from URCs is transformed into well-developed ordinary capabilities, ultimately leading to high levels of business performance within a specific type of NTBFs: agtechs. Accordingly, this model is designed to address two main processes: (a) the conversion of knowledge into ordinary capabilities, and (b) the translation of these ordinary capabilities into superior organizational performance. Our research model is depicted in Figure 1:

Figure 1 – Research model



Source: Elaborated by the author.
Notes: The blue ovals of the figure represent ordinary capabilities that are configured to enhance the performance of agtechs. The green rounded rectangles represent the different channels through which specialized knowledge is transferred from the URCs to aid in the development of agtech capabilities. Abbreviations: TEC = technological capabilities; MKT = marketing capabilities; INN = innovation capabilities; NET = networking capabilities; FIN = financial capabilities; HRM = human resource capabilities; EXC = execution capabilities; ORG = organizational capabilities.

3 RESEARCH METHODS

To operationalize the research objectives, we employ a mixed method approach consisting of three phases, comprising of exploratory and explanatory stages. This research strategy aligns with recent studies that have developed and tested conceptual models in this field (e.g., KREILING; BOUNFOUR, 2020). Given that knowledge transfer and entrepreneurial activities are highly dependent on context (see KRUGER; STEYN, 2020; MARR; PHAN, 2020), this study will be conducted in two distinct institutional settings: Brazil and France (the research context is further discussed in Section 3.4). This design provides a unique opportunity to examine the various challenges that enhance or impede the outcomes of entrepreneurs and universities in each context.

In the first step of our research, we developed a conceptual framework by building upon existing theories, as outlined by Imenda (2014). To conduct a thorough literature review, we employed a multi-faceted approach (TRANFIELD; DENYER; SMART, 2003) by replicating searches in the four primary databases of management studies and utilizing the 'snowballing' technique to include frequently cited articles that were not initially found in the database searches. This strategy ensured that our literature review was comprehensive and captured all relevant studies in the field. By limiting our selection to peer-reviewed articles with high impact factors, we aimed to ensure the quality of the studies, avoiding the inclusion of low-quality, as highlighted by Hunt (1997). This methodology resulted in the review of a total of 584 articles. As a result of this phase, we arrived at the first version of our research model, composed of 4 ordinary capabilities that are essential for agtech businesses and 14 URC knowledge transfer channels that appear to aid in the development of these capabilities.

In Step 2, we refined the model created in the previous step by incorporating empirical data and using the methods suggested by Jabareen (2009). To gather this data, we conducted a series of interviews with agtech entrepreneurs in both Brazil and France, following the approach outlined by Eisenhardt (EISENHARDT, 1989). We also interviewed key stakeholders in the agtech industry, such as investors, business advisors, and development agency leaders, to validate the information obtained from the entrepreneurs. Through a comprehensive analysis of all the data, we were able to confirm the formative elements of the initial model and identified four additional key capabilities. Furthermore, we found that out of the 14 knowledge transfer channels proposed in the initial research model, only 8 were relevant in the context of agtechs. As a result, our final research framework includes 8 ordinary capabilities and 8 relevant knowledge transfer channels. The final framework was then reviewed by experts in the field of strategic management for further validation.

In Step 3, we operationalized the conceptual model developed in previous steps by using an explanatory approach. To do this, we established standardized metrics for each dimension and utilized survey techniques to develop a comprehensive questionnaire in Portuguese and French, the main languages of Brazil and France respectively. The data collection occurred between August and December 2022, and it was conducted through an electronic form that was sent to the owners and managers of agtech that are in the growth or scale-up stages. We chose to exclude early-stage NTBFs as they typically have not yet developed well-established capabilities and do not yet have consistent outcomes, which would make it difficult to accurately assess their firm performance. This approach resulted in a sample of 48 agtechs in Brazil and 52 in France. To determine if agtechs that rely more on URC knowledge have more developed ordinary capabilities and which knowledge transfer channels are most effective, we used Mann–Whitney U tests. To investigate how agtechs configure their ordinary capabilities to achieve better performance outcomes, we employed the fsQCA method. The following sections will provide further explanation of the research context and the three major steps of this research.

3.1 RESEARCH CONTEXT

Our research focuses on agtechs, a type of NTBF that provides innovative technologies to the agriculture and food industries, with the aim of enhancing their sustainability, efficiency, and profitability (STARTUP GENOME, 2019). Agtechs employ a range of technologies to increase productivity, improve resource efficiency, and reduce ecological impact (DUTIA, 2014), with the potential to generate food technologies that can positively impact the environment, society, and the economy (VITON; LESKA; TEIXEIRA, 2019).

Agtech innovations often involve the integration of biological, chemical, physical, ecological, economic, and social sciences (KAMILARIS; KARTAKOULLIS; PRENAFETA-BOLDÚ, 2017; PRETTY, 2008), and frequently include remote sensors, big data, artificial intelligence, and other digital technologies (VITON; LESKA;

TEIXEIRA, 2019). For example, agtechs can offer smart farm solutions that provide information monitoring and analysis of weather, pests, and soil and air temperature, which can enhance the resource base on which agriculture relies (BONGIOVANNI; LOWENBERG-DEBOER, 2004; STARTUP GENOME, 2019). Agtech solutions can also include 'integrated farming systems' that combine advances in genetic engineering, information technology, and smart machinery (DUTIA, 2014).

Agtech innovations can be classified into three categories based on their position in the agribusiness chain: upstream, midstream, and downstream. Upstream agricultural activities involve agriculture inputs such as seeds, fertilizers, machinery, and technology for agriculture. Midstream agricultural activities are related to food production on the farm, while downstream solutions are associated with the food processing industry (SCOTT, 2015).

Agtechs play a crucial role in overcoming global sustainability challenges such as increases in grain consumption and limited access to water and unused fertile land (DUTIA, 2014). They are essential for the advancement of food production and distribution systems and have drawn increasing attention from entrepreneurs, producers, policy makers, and agribusinesses (GRAY et al., 2004). For example, agtechs are instrumental in augmenting the food supply by 56% to address global population requirements by 2050, given the increasingly limited natural resources (SEARCHINGER et al., 2019). As agtech solutions contribute to a more sustainable agribusiness chain, they are directly related to several United Nations (UN) Sustainable Development Goals, including Goal 2 - Zero Hunger, Goal 3 - Good Health and Well-Being, Goal 13 - Climate Action, Goal 14 - Life Below Water, and Goal 15 - Life on Land.

In addition to their industry-specific characteristics, agtechs face two distinct challenges that motivated our decision to analyze them. The first is that the agtech innovation process is time-consuming and resource-intensive, on average. For instance, the development of biological solutions has a prolonged cycle, which can delay market launch (BOEHLJE; ROUCAN-KANE; BRÖRING, 2011). Furthermore, agtech innovations may face social and legal pressures, as environmental and social concerns have become increasingly prevalent in contemporary society. As a result, the creation and development of innovations depend on strategic alignment in terms of both technical effectiveness and social legitimacy (BOEHLJE; BRÖRING, 2011; VERBEKE, 2007).

The second challenge that sets agtechs apart from other NTBFs is their distinct scaling process due to differences in innovation adoption by practitioners in the agribusiness industry. Adoption is primarily driven by the adopter's social context, powerful external influences, and imitation within an adopter group, rather than a desire for technological efficiency (SNEDDON; SOUTAR; MAZZAROL, 2011). This slow and low adoption tendency is mainly due to farmers' conservative approach along the spectrum of risk and reward. They tend to adopt solutions that offer greater benefit to their current technology, especially when they perceive the initial investment to be high-cost (YIGEZU et al., 2018). These particularities can make agtechs more dependent on universities' knowledge and resources to survive and grow compared to other NTBFs. Evidence suggests that almost 60% of European biotech-based entrepreneurial firms, including agtechs, emerged with university support (BONARDO; PALEARI; VISMARA, 2010).

Moreover, since knowledge transfer and entrepreneurial activities are highly dependent on the specific context in which they occur (see ALEXANDER; MARTIN, 2013; KRUGER; STEYN, 2020; MARR; PHAN, 2020), we chose to focus our analysis on two major global players in production and innovation for the agribusiness chain with contrasting institutional realities: Brazil and France. Brazil is the largest food producer in Latin America and the headquarters for most of the emerging agtechs in the region (VITON; LESKA; TEIXEIRA, 2019). Brazil has significantly increased its investments in innovation for agribusiness over the last decade, resulting in the emergence of more than 1,500 agtechs (FIGUEIREDO; JARDIM; SAKUDA, 2021). In contrast, France is the largest food producer in Europe, with eight large innovation clusters dedicated to agribusiness (MAA, 2020), making it one of the largest agtech hubs in Europe. Due to these factors, Brazil and France provide an ideal context for our research. In the next section, we will provide further details about our research context.

3.1.1 The agtech ecosystem in Brazil

Brazil has a highly conducive environment for agtechs, with 1,574 agtech firms located primarily in the southern and southeastern regions (see Table 2). The country is one of the top four food producers in the world and is a leading producer and exporter of coffee, soy, corn, sugar cane, orange, poultry, pork, and cattle (FAO, 2021). In 2021, agribusiness accounted for approximately 27.4% of Brazil's GDP (CEPEA, 2022). Despite its growth, the industry still has potential to expand without compromising local biodiversity, given that over 66% of the land in Brazil remains untouched (DIAS; JARDIM; SAKUDA, 2019).

The Brazilian agribusiness sector has a strong appetite for new technologies. Agricultural production in Brazil has quadrupled since 1975, while the use of inputs has only increased by about 15%, suggesting that growers have relied on technology to increase productivity (EMBRAPA, 2018; GASQUES, 2017). Numerous public policies have been implemented to support agricultural activities in Brazil since the end of the 19th century. Many universities have become qualified to provide educational and research-based services for the agribusiness industry (see Table 3).

Table 2 – Brazilian agtechs by region (N = 1,574)

Region	**State**	**N**	**%**
Midwest	Distrito Federal (DF)	17	1,08%
	Goiás (GO)	30	1,91%
	Mato Grosso (MT)	30	1,91%
	Mato Grosso do Sul (MS)	17	1,08%
	Total	**94**	**5,97%**
North	Amazonas (AM)	4	0,25%
	Amapá (AP)	1	0,06%
	Pará (PA)	15	0,95%
	Rondônia (RO)	0	0,00%
	Roraima (RR)	0	0,00%
	Tocantins (TO)	8	0,51%
	Total	**28**	**1,78%**
Northeast	Alagoas (AL)	0	0,00%
	Bahia (BA)	25	1,59%
	Ceará (CE)	13	0,83%
	Maranhão (MA)	1	0,06%
	Paraíba (PB)	7	0,44%
	Pernambuco (PE)	11	0,70%
	Piauí (PI)	4	0,25%
	Rio Grande do Norte (RN)	9	0,57%
	Sergipe (SE)	2	0,13%
	Total	**72**	**4,57%**
South	Paraná (PR)	151	9,59%
	Rio Grande do Sul (RS)	124	7,88%
	Santa Catarina (SC)	122	7,75%
	Total	**397**	**25,22%**
Southeast	Espírito Santo (ES)	20	1,27%
	Minas Gerais (MG)	143	9,09%
	São Paulo (SP)	757	48,09%
	Rio de Janeiro (RJ)	63	4,00%
	Total	**983**	**62,45%**
Brazil	**Total**	**1574**	**100,00%**

Source: Figueiredo et al. (2021).

For instance, the Luiz de Queiroz College of Agriculture is considered the ninth best university for agricultural science worldwide (U.S.NEWS, 2021) and has supported more than 40 agtech firms that have emerged in the AgTech Valley ecosystem in Piracicaba/SP (DIAS; JARDIM; SAKUDA, 2019). Additionally, research institutions such as EMBRAPA, the Brazilian agricultural research corporation, have been created to support farming, manufacturing, and the development of new technologies (DIAS; JARDIM; SAKUDA, 2019; GASQUES; BACCHI; BASTOS, 2018).

Table 3 – Universities specializing in agribusiness technology in Brazil

Region	State	University	Site
Midwest	GO	Univ. Federal de Goiás (UFG)	https://www.ufg.br/
	MT	Univ. Federal de Mato Grosso (UFMT)	https://www.ufmt.br/
	MS	Univ. Federal de Mato Grosso do Sul (UFMS)	https://www.ufms.br/
South	PR	Univ. Estadual de Londrina (UEL)	https://portal.uel.br/
	PR	Univ. Estadual de Maringá (UEM)	http://www.uem.br/
	PR	Univ. Federal do Paraná (UFPR)	https://www.ufpr.br/
	RS	Univ. Federal do Rio Grande do Sul (UFRGS)	http://www.ufrgs.br/
	RS	Univ. Federal de Santa Maria (UFSM)	https://www.ufsm.br/
	SC	Univ. Federal de Santa Catarina (UFSC)	https://ufsc.br/
Southeast	MG	Univ. Federal de Lavras (UFLA)	https://ufla.br/
	MG	Univ. Federal de Viçosa (UFV)	https://www.ufv.br/
	SP	Univ. Estadual Paulista (UNESP)	https://www.unesp.br/
	SP	Univ. Estadual de Campinas (UNICAMP)	https://www.unicamp.br/
	SP	Univ. de São Paulo (ESALQ/USP)	https://www.esalq.usp.br/
	SP	Univ. Federal de São Carlos (UFSCar)	https://www2.ufscar.br/
	RJ	Univ. Federal Rural do Rio de Janeiro (UFRRJ)	https://portal.ufrrj.br/

Source: Dias, Jardim and Sakuda (2019).

Brazil's efforts in agtech have also led to new institutional arrangements, such as strong agtech ecosystems involving accelerators, incubators, innovation hubs, and science parks dedicated to agribusiness (EMBRAPA, 2018). As a result, Brazil currently accounts for 51% of all agtech firms in Latin America and the Caribbean (VITON; LESKA; TEIXEIRA, 2019). Furthermore, Brazil holds 90% of venture capital investment in Latin America (CRUNCHBASE, 2020), indicating significant support from private investors.

Overall, Brazil's thriving agribusiness sector and conducive environment for agtechs, along with public and private efforts to support research and development in this field, have led to a strong agtech ecosystem in the country. These efforts have enabled agtech firms in Brazil to innovate and develop solutions that improve the sustainability, efficiency, and profitability of agribusinesses, with significant potential to address global food security challenges.

3.1.2 The agtech ecosystem in France

France is a leading agricultural producer in Europe, accounting for 18% of European agricultural production and a trade surplus of €7.9 billion in 2019. The French agri-food industry is the 6th largest in the world, and France is a major exporter of beverages, wines, and spirits. Animal production, particularly milk, cattle, poultry, and pigs, is also crucial to the French economy (AGRESTE, 2020; EUROPEAN COMMISSION, 2020).

To support innovation in the agribusiness industry, the French government has fostered 9 regional competitiveness clusters (see Figure 2), bringing together universities, startups, large companies, incubators, accelerators, laboratories, venture capitalists, and other actors to collaborate on agri-food innovation projects (DGCIS, 2014). These clusters were designed around specific themes in each region, creating an environment that fosters innovation and strengthens the regional economy. Examples of these clusters include Aquimer, which focuses on aquaculture innovation solutions; Nutrition Santé Longévité, which focuses on health and nutrition; and Valorial, which focuses on innovative solutions for various food products (MAA, 2020).

Other actors have also emerged to strengthen these ecosystems, such as La Ferme Digitale (LFD), an association of agtechs founded in 2016 that promotes innovation and digital technology for efficient, sustainable, and civic agriculture. LFD brings together more than 110 agtechs that together employ more than 2000 collaborators (LFD, 2023). INRIA, the French National Institute for Research in Digital Sciences and Technology, with over 3,900 researchers and engineers in many fields, is another important player in this agribusiness innovation (INRIA, 2023). INRIA's focus on innovation in agribusiness has led to the launch of many NTBFs, including the agtech Dilepix, located in Rennes, Brittany.

Figure 2 – Competitiveness clusters in France (Pôles de Compétitivité)

Source: adapted from MAA (2020, p. 4).

The French agtech ecosystem has received more than one billion Euros of investment since 2013, and investments increased by 66% in 2019 (FOOD MATTERS, 2020). While there is no detailed mapping of agtechs in France, it is assumed that there are about 250 agtech firms in the country (EURACTIV, 2020), mainly located around Paris and the 9 innovation clusters dedicated to agribusiness innovation.

The evidence presented highlights that France and Brazil are significant global players in agribusiness production and innovation, despite their significant economic and institutional differences. The similarities in agribusiness, combined with the divergent economic and institutional contexts, provide a unique opportunity to analyze and compare the agtech ecosystems in both countries. In the following sections, we detail the methodological procedures utilized in this study.

3.2 STEP 1 – DEVELOPMENT OF CONCEPTUAL FRAMEWORK

We developed the preliminary version of our conceptual model by conducting two secondary processes. Firstly, we used the model proposed by Becerra et al. (2019) as a foundation to identify the channels through which agtech can acquire specialized knowledge from universities and research centers (URCs). This model was chosen as it has been consistently applied in various settings, both in developing and developed countries (ALEXANDER et al., 2020; see, ALEXANDER; CHILDE, 2012; ALEXANDER; MARTIN, 2013; BECERRA; CODNER; MARTIN, 2019), making it an appropriate theoretical-conceptual starting point for understanding the phenomenon of knowledge transfer. In Section 2, the conceptual background underlying the set of knowledge transfer channels from URCs was thoroughly presented and discussed.

Second, we conducted a systematic review to identify the key ordinary capabilities that are critical for the performance of new technology-based firms (NTBFs), following the three-stage procedure outlined by Tranfield et al. (2003). Other recent studies in the field of business and management have also adopted a similar approach (see CALABRESE et al., 2018; EVELEENS; RIJNSOEVER; NIESTEN, 2017; SASSMANNSHAUSEN; VOLKMANN, 2018).

In Stage 1, we developed the review protocol. To identify relevant studies, we used two search strings, which function as two criteria to find data closely related to our subject. String 1 aimed to return new technology-based firms, using the following: "startup*" OR "start-up*" OR "NTBF*" OR "New Technology-Based Firm*" OR "NTV*" OR "New Technology Venture*" OR "YIC" OR "young innovative compan*". String 2 intended to find papers related to capability issues: "dynamic capabilit*" OR "capabilit*". Notably, we opted to include the term 'dynamic capabilit*' to ensure the comprehensive inclusion of papers related to the broader subject of 'capabilities,' ensuring that all relevant literature was considered in our analysis.

Subsequently, during the refinement process, we judiciously excluded articles that were not directly pertinent to our research objectives. It's important to note that the asterisk (*) serves as a 'wildcard character,' enabling variations in word endings and enhancing the inclusivity of our search criteria. Therefore, for a paper to be included in our sample, it must contain at least one word from both Strings 1 and 2 within its title, abstract, or keywords.

Furthermore, our search was intentionally confined to English-language articles within the fields of business, management, or economics. Additionally, we limited our consideration to studies published from 1997 onwards, a pivotal year marked by the release of the seminal work by Teece, Pisano, and Shuen (1997). This methodological choice aligns with established practices in previous studies focused on capabilities (see BITENCOURT et al., 2020; FAINSHMIDT et al., 2016).

In Stage 2, we conducted a search for relevant papers in the Web of Science, Scopus, ProQuest, and Science Direct databases in August 2020. Following the search procedures outlined earlier, we found 475, 334, 83, and 64 papers, respectively. After combining the data and removing duplicated information, 584 papers remained in our sample[1]. We then conducted a rigorous review of the data collected. Table 4 provides additional details regarding the paper search and the inclusion criteria.

[1] The full data is available on: https://bit.ly/33255z4.

Table 4 – Systematic review: inclusion criteria

Criteria used for search (Web of Science, Scopus, and ProQuest)			
String 1*	"startup*" OR "start-up*" OR "NTBF*" OR "New Technology-Based Firm*" OR "NTV*" OR "New Technology Venture*" OR "YIC" OR "young innovative compan*"		
String 2*	"dynamic capabilit*" OR "capabilit*"		
Search date:	20/08/2020		
Criteria used for search (Science Direct)**			
String*	("startup" OR "start-up" OR "NTBF") AND ("dynamic capabilit" OR "competenc" OR "capability")		
Search date:	20/08/2020		
Filters applied to searches on the database			
Web of Science	**Scopus**	**ProQuest**	**Science Direct**
Management	Business, Management and Accounting	Business and management related journals***	Business and management related journals***
Business	Economics, Econometrics and Finance	Scholarly Journals	Review articles
Economics	Decision Sciences	Peer reviewed	Research articles
Business finance			
Public Administration			
Operations Research Management Science			
English	English	English	English
Article	Article	Article	Article
Year: 1997 onwards	Year: 1997 onwards	Year: 1997 onwards	Year: 1997 onwards
Search outcome: 475	**Search outcome: 334**	**Search outcome: 83**	**Search outcome: 64**

Notes: *We employed these strings to conduct searches for papers containing this specific set of words within the abstract, title, or keywords. **We applied different criteria when conducting research on Science Direct due to the platform's limitations. Our goal was to select the central concepts from the search strings to ensure the integrity of our research. ***To identify papers from journals related to business and management, we employed the criteria established by Scimago.

In our sample, we included studies that focused on analyzing various types of new technology-based firms (NTBFs), such as high-tech start-ups, new technology ventures, research spin-offs, academic spin-offs, and university spin-offs. However, we excluded studies that focused specifically on corporate spin-offs (CSOs) as they are typically founded by previous employees of established firms in the same industry. These "parent firms" often provide CSOs with a variety of resources such as knowledge, skills, and ideas, which results in different starting conditions for these new ventures (LEJPRAS, 2014).

To ensure the quality and accuracy of our literature review, we only included studies that were published in high-ranked, peer-reviewed journals in the first quartile, with an H-Index of 50 or higher. This procedure is similar to those used in other studies (see ROSENTHAL; DIMATTEO, 2001; SCHOMMER; RICHTER; KARNA, 2019) and aims to prevent the inclusion of low-quality studies, which can lead to the "garbage in, garbage out" issue (HUNT, 1997). Additionally, we eliminated papers that did not have a relationship between firm capabilities and NTBF performance as a result of their research. Table 5 provides a summary of the exclusion criteria employed, along with the count of papers remaining in the sample following the application of each criterion.

Table 5 – Systematic review: exclusion criteria

Exclusion criteria	**Papers retained within the sample**
Total initial search papers	956
Papers after duplicate removal	584
Papers in high-ranking journals (H-Index ≥ 50 and Q1)	362
Papers after subject-based filtering	102
Papers filtered by firm type	50
Papers studying the capabilities-performance relationship	27

Source: Elaborated by the Author.

As shown in Table 5, our final sample comprises 27 research papers. In Appendix A, we have detailed the authors, source (journal), year of publication, research methodology, evaluated capabilities, performance metrics, and key findings pertinent to our research area for each of these papers. Additionally, in Appendix B, we provide a comprehensive table that includes all the papers identified in our initial search, after removing duplicate records (N = 584). Given the extensive nature of this dataset, it was not feasible to include it in its entirety within this manuscript. To enhance the transparency of our study, we have made the complete database accessible through an electronic repository, complete with a permanent link (https://bit.ly/33255z4). This repository includes detailed information on all the articles, enabling clear identification of the articles searched and the criteria used for their selection.

In Stage 3, we conducted a comprehensive analysis of the data obtained in the previous stages. This analysis yielded ample evidence that demonstrates a positive association between ordinary capabilities and the performance of NTBFs (ORTÍN-ÁNGEL; VENDRELL-HERRERO, 2014; PARADKAR; KNIGHT; HANSEN, 2015; WU, 2007). In summary, our literature review found evidence for four key ordinary capabilities that are critical for the performance of NTBFs and are well-represented in the research to date: (1) network capabilities (MCGRATH; MEDLIN; O'TOOLE, 2019; PARIDA et al., 2017), (2) marketing capabilities (AHMADI; O'CASS, 2018; AHMADI; O'CASS; MILES, 2014; PEARCE; PEARCE II, 2019), (3) technology capabilities (JENSEN; LÖÖF; STEPHAN, 2020; LAURELL; ACHTENHAGEN; ANDERSSON, 2017; RAMÍREZ-ALESÓN; FERNÁNDEZ-OLMOS, 2018), and (4) innovation capabilities (JENSEN; LÖÖF; STEPHAN, 2020; ZHENG; LIU; GEORGE, 2010). These capabilities were presented and discussed in Section 2 of our study.

3.3 STEP 2 – VALIDATION OF CONCEPTUAL FRAMEWORK

In order to refine the research model developed in Step 1, we employed a qualitative analytical approach following Eisenhardt's (EISENHARDT, 1989) methodology. Similar to previous studies (e.g., ALEXANDER; MARTIN, 2013; MILLER et al., 2016), we relied on empirical data to validate the findings that emerged from the literature. Semi-structured interviews were conducted with agtech entrepreneurs and stakeholders such as investors, business advisors, and managers of innovation habitats in both Brazil and France. These different data sources enabled us to cross-check the information and gather refined knowledge about how agtechs access specialized knowledge from URCs and how this knowledge aids in the development of agtech capabilities (EISENHARDT, 1989; YIN, 1994). This process can be divided into five procedures: development of the interview protocol, selection of relevant cases, conducting the interviews, interview transcription, and data coding and analysis. In the following sections, we detail each of these procedures.

3.3.1 Development of the interview protocol

In order to operationalize the interviews, we created a specific interview protocol which was replicated in the same form in Portuguese and French languages (see Appendix C and Appendix D). This document served as a guide for the interview process, outlining which topics should be covered and how. Additional questions were added as needed to clarify any points. This semi-structured approach is a common method in research on knowledge management and capabilities (FACCIN et al., 2019; GHOSH; MEHTA; AVITTATHUR, 2021; VAN DER STEEN; ENGLIS; MEYER, 2013; VORHIES; ORR; BUSH, 2011).

Our interview protocol is divided into six sections. The first three sections focus on identifying the inhibitory and success factors in the pre-startup, startup, and scale-up phases. Our goal is to understand the main challenges and key elements that contribute to overcoming these barriers and promoting the development of the firm in each phase, including practices, skills, and resources. This information allows us to identify the capabilities developed and mobilized to overcome these challenges, validating those identified in literature and identifying new ones, such as execution, organizational, human resource management, and financial capabilities, which are under-explored in the context of NTBFs. The new capabilities identified were discussed and introduced in the theoretical background section.

In Section 4 of the interview protocol, we probed the respondents about the networking, technology, marketing, and innovation capabilities of their firms. It is essential to note that our focus was not on understanding the individual competencies of a specific person but on understanding the capabilities of the firm as a whole. Our goal was to evaluate the extent to which these capabilities are developed and utilized by agtechs to overcome barriers in each business phase and understand the relationship between these capabilities and firm effectiveness. This information enabled us to confirm the significance of these capabilities for agtechs and gain insight into how they are configured in each phase to achieve desired outcomes.

In Section 5, we sought to understand the extent to which agtech firms rely on universities and research centers (URCs) to acquire specialized knowledge in the areas of technology, management, market, and manufacturing and procedures. Through this process, we aimed to identify the types of knowledge from URCs that are most valuable for agtech firms in each phase of their business. Additionally, we asked about the channels used to acquire knowledge from URCs and requested practical examples to gain a deeper understanding of the transfer process. The data collected through this procedure enabled us to determine that, of the 14 knowledge transfer channels initially identified in our research model, only 8 are effectively utilized by agtech entrepreneurs. Finally, in Section 6, we asked for information about the profile of the firms and entrepreneurs to better understand and categorize the investigated cases.

Before carrying out the interviews, the two versions of the interview protocol, in Portuguese and French, were reviewed by experts in the field of strategic management research, native speakers of the respective languages to ensure linguistic accuracy. In the following section, we will outline the process for selecting the relevant cases for validation of the research model.

3.3.2 Selection of relevant cases

Based on previous research (ANDERSON; GERBING, 1988; ZHANG; MERCHANT, 2020), we conducted eight interviews in each country to gather relevant insights to refine our research model. To properly select respondents who could provide accurate information, we established a set of criteria that needed to be met for a case to be eligible for an interview. We selected both agtech entrepreneurs and key stakeholders, such as managers of innovation habitats and research centers, investors, and business advisors.

To be considered an eligible agtech case, the firm had to meet all the requirements for being considered a NTBF (a) provide evidence of having an innovative, repeatable, scalable, and profitable business model (BLANK; DORF, 2012; RIES, 2011), (b) not be affiliated with a corporate group (SPENCE; CRICK, 2006), (c) have fewer than 250 employees (EUROSTAT, 2020; GARCÍA-CABRERA; GARCÍA-SOTO; OLIVARES-MESA, 2019), and (d) be less than 10 years old at the time of interview (AMEDOFU; ASAMOAH; AGYEI-OWUSU, 2019). Additionally, to be considered a unique case, the agtech must have demonstrated consistent growth – in terms of sales or employees – over the past three years and have secured at least one round of investment.

To be considered as an eligible stakeholder for the interview, we targeted investors or leaders of innovation habitats and/or research centers who possess a minimum of 5 years of experience with agtech innovations in both Brazil and France. In accordance with this criterion, we dispatched over 50 invitations to identify potential cases and schedule interviews (see Tables 6 and 7).

Table 6 – Interviews from Brazil

Case	Type	Case description	Performance highlights	Investments raised	City	Founded in	Interviewee's profile
Case A	Agtech	It offers an on-farm, integrated biological management system for a variety of crops, including soybean, corn, wheat, cotton, and others.	In a period of 5 years, its workforce has expanded significantly, growing from less than 10 employees to over 350.	R$13.5 million	Gurupi	2016	CEO
Case B	Agtech	It provides a digital tool that utilizes data to aid farmers, agronomists, and consultants in the intelligent management of soybean cultivation.	It has been nominated for the Global Meetup 2021 Innovation Award. In the past three years, its revenue has increased by 300% annually.	R$1.5 million	Porto Alegre	2016	CEO
Case C	Agtech	It creates bioproducts and bioprocesses using marine biodiversity found in Brazil for various industrial sectors.	Its revenue has increased by 100% from 2021 to 2022, rising from R$4 million to R$8 million. It has achieved the first place in the Ranking 100 Open Startups 2021 - Top BioTechs category (Brazil).	Investment amount undisclosed.	Porto Alegre	2011	CEO
Case D	Agtech	It offers a platform that connects small farmers with retailers using data intelligence for sustainable food. It allows for direct connection between family farmers and supermarkets, promoting fair trade.	Since its foundation, its revenue has grown by 300% annually.	R$4.2 million	São Paulo	2016	CEO
Case E	Agtech	It has created a comprehensive suite of hardware and software designed to monitor the vital signs of dairy cows, alerting farmers to the heat cycle and enabling early detection and prevention of diseases.	In the last three years, the company's revenue experienced a 106% increase.	R$7.94 million	Santa Maria	2011	CEO

Case F	Agtech	It provides a management system that seamlessly integrates agricultural operations with financial management, consolidating information to improve efficiency and streamline the work of farmers.	It serves more than 4,700 farms and has over 5,000 users. Additionally, it has been ranked in the 3rd position in the Great Place to Work's TI 2020 list (Brazil).	R$14.5 million	Porto Alegre	2016	CEO
Case G	Incubator	This organization supports NTBFs that are focused on research, development, and innovation, with the goal of promoting the dissemination of knowledge, new technologies, and innovative practices.	It is affiliated with a public university that has a well-established reputation for expertise in agricultural sciences in Brazil. It has received several awards and quality certifications in Brazil.	-	Santa Maria	1999	CEO
Case H	NTBF Cluster	It is a non-profit organization that aims to support the growth and development of NTBFs in a specific Brazilian state through four main strategies: fostering knowledge sharing, connecting talented individuals, providing access to investors, and promoting business development.	It boasts a community of over 5,000 entrepreneurs, 750 NTBFs, and 100 established companies. It operates in over 50 different cities.	-	Porto Alegre	2015	CEO

Source: Elaborated by the Author.

Table 7 – Interviews from France

Case	Type	Solution	Performance highlights	Investments raised	City	Founded in	Interviewee's profile
Case 1	Agtech	Software solutions for animal monitoring, disease and weed detection, flowering stage, insect pest invasion and autonomous precision actions.	It was also accepted to the NETVA and Agri NEST acceleration programs in the United States.	€1.14 million	Rennes	2018	CEO
Case 2	Agtech	It creates insect protein for animal feed to promote sustainable agriculture and address resource scarcity with minimal carbon impact.	The company's 2025 objective is to increase its production capacity to 100,000 metric tons, i.e., approximately 10% of the worldwide insect protein market.	€10.2 million	Paris	2014	CEO
Case 3	Agtech	It is leader in the field of pheromones for biological crop protection.	It has more than 160 employees and is present in 63 countries. They launched 50 new products in the last four years. They were awarded by European Business Award for Environment (among others).	€100 million	Saint Cloud	2012	CMO
Case 4	Agtech	It transforms insects into premium, high-value ingredients for pets, fish, plants, and human beings, offering an organic, long-term sustainable solution to accelerate consumption of protein and plants.	It raised the largest-ever agtech funding deal outside of the United States. It is the world leader in the production of natural insect proteins.	€300 million	Paris	2011	CEO

Case 5	Agtech	It combines active ingredients derived from plant extracts and seaweed to develop high-performance, sustainable, and proven biosolutions. Its job is to design, manufacture and certify the innovations that make agriculture and livestock evolve.	It recently built a new 3500m² factory to produce more than 5,000,000 liters of biosolutions.	€2.4 million	Brive-la-Gaillarde	2012	CEO
Case 6	Accelerator network	It is a network of startup accelerators that relies on innovation ecosystems to support business transformation in the regions. This initiative offers venues for exchanges, business meetings and development paths meeting the needs of entrepreneurs.	It offered support for more than 1200 startups and invested more than 1 billion Euros in these businesses.	-	Paris	2014	Manager
Case 7	TTO	Its mission is to add value to the results produced by public research laboratories, in Brittany and the Pays de la Loire, and to offer socio-economic players with attractive innovation resources.	It supported more than 2500 innovation projects. 391 filed patents. 79 million euros in hired projects. 67 startups developed.	-	Rennes	2012	Project manager
Case 8	Incubator network	It offers incubation services to startups from many fields.	7 business incubators. 122 offices and laboratories for rent (accounting for more than 10.000m² of space). More than 80 companies supported.	-	Rennes	No information available	Economic Development Director

Source: Elaborated by the Author.

3.3.3 Conducting the interviews

The interviews were conducted from November 2021 to February 2022, following consistent procedures in both Brazil and France. Before each interview, we performed online research to gather up-to-date information on the business maturity and performance of each agtech, which served as a reference and helped us verify the information collected during the interview.

To protect the privacy and well-being of the interviewee, we explained the context of the research and ensured that participating posed no psychological or cultural, social, moral, religious, or ethical risks. We emphasized that all data collected would remain anonymous and obtained the interviewee's consent to record the meeting.

To ensure the highest quality, the interviews were conducted through an online platform, utilizing tools to guarantee clear audio and video recordings. This facilitated the transcription process and minimized the chance of losing any important information. After each interview, we were able to review the recordings and gather additional insights as needed. Each interview lasted approximately one hour and fifteen minutes, and all files were securely stored on an encrypted online server for privacy and security.

3.3.4 Interview transcription

The process of interview transcription involved translating audio recordings of the interviews into written text format. This accurately captured all spoken words, identifying each speaker and indicating their respective statements. To ensure the highest quality, professional transcription services were hired for Portuguese and French. This was extremely beneficial as it facilitated the organization and analysis of collected data, providing a clear and well-organized record of the information gathered during the interviews. This allowed us to efficiently reference specific points and analyze the data in a systematic manner. The transcriptions were also thoroughly reviewed and revised by the researchers. The combined transcriptions totaled 386 pages of written text.

3.3.5 Data coding and analysis

Following the procedures outlined by Xie and Wang (2020), we took three steps in the coding process for the interviews. The first step involved open coding, which aimed to identify and develop the key concepts, categories, and attributes related to the subject under investigation (PANDIT, 1996). Furthermore, we disregarded any concepts that appeared fewer than three times in our analysis. For instance, we categorized the following evidence as 'networking capabilities' (Case D):

> "So, even from the start, it's really important to be truly connected to the entire ecosystem. You really need to understand how it works, and to do that, you need to integrate yourself into it. It's really a part of that network. We must integrate competitiveness clusters, we must in fact integrate networks".

The second step in the process was axis coding, which aimed to uncover the logical associations between the various categories on a more conceptual level. Through a comparative examination of the original data, the initial categories were reclassified and named until they reached a state of full saturation. The third step, called selective coding, involved unifying all categories around the central, core categories (CORBIN; STRAUSS, 1990; XIE; WANG, 2020).

This process allowed us to confirm that the four types of ordinary capabilities identified through literature review are applicable in the agtech context. These capabilities are: (a) networking capabilities, (b) marketing capabilities, (c) technological capabilities, and (d) innovation capabilities. In addition, our empirical data revealed the presence of four additional capabilities: (e) execution capabilities, (f) financial capabilities, (g) human resource management (HRM) capabilities, and (h) organizational capabilities. While these capabilities are not novel in the field of strategic management, their role in NTBFs has received limited attention in the literature. For this reason, we did not find much literature to support our findings. The results of the codification process of the ordinary capabilities are presented in a summarized form in Table 8. This table provides a condensed overview of the findings and makes it easier to understand and analyze the data.

Table 8 – Coding process: ordinary capabilities

Main categories	Concepts	Representative quotes	Organization
Networking capabilities	Networking capabilities are the "abilities to initiate, maintain, and utilize relationships with various external partners" (WALTER; AUER; RITTER, 2006, p. 546).	Finally, I'm not sure if it's specific to the village, but they also have in their network a whole panel of companies that are often either invited to events or directly invited to the village, or there is direct connection between the startups and these companies. And all these scenarios mean that there can be business created with these contacts and it is also easier to be supported by a group like Crédit Agricole, who recommends us to customers because if we went there ourselves as a small startup that has just been created, it can sometimes be less effective.	Case 1
		This is something that I always seek, so I have a network of mentors who are close to me and help me with the day-to-day business. This really helps. So, we don't have this structured, but these are things that we really strive for.	Case D
		In 2017, we joined the Endeavor scaling programs. The company opened in 2016 and in 2017 we connected with them. So, we went through a lot of acceleration and mentorship. And then, from the mentorship, actually the connections, ended up bringing solutions faster than you would expect.	Case A
Marketing capabilities	Marketing capabilities refer to "the experiential knowledge, skills, and related processes to undertake marketing activities" (AHMADI; O'CASS; MILES, 2014, p. 704).	Well, I think we had market knowledge, we knew the market about various aspects, from the producer's point of view, from the corporation's point of view, from the distribution's point of view, from the cooperative's point of view. In other words, the founders brought together market knowledge to better understand how we could build or not alliances, develop or not the market and so on. So that was something very, very important!	Case B
		The problem with most startups is that, besides not understanding this concept in practice, they don't have a sales guy. So they have a founder there who thinks he's a salesperson, who in fact is a generalist who understands a little bit of everything and goes there	Case A

		to make a speech. No! I need a guy with fire in his eyes who closes deals! So starting with identifying the customer and evaluating the sales cycle is also pretty important. So we quickly went to see the customers. [...] So for the first samples of insect flour, we went to see some customers to try and gauge the market. Do they have a need, what are their challenges, and what is their sourcing? And what is their price of interest, etc. So, knowing your customers and market is super important, it's not just about the technique.	Case 2
Technological capabilities	Technological capabilities refer to the firm's experiential knowledge, skills, and related processes for designing, developing, and manufacturing new products and/or services. (AHMADI; O'CASS; MILES, 2014; ZHOU; WU, 2010).	My focus is based on technology. I want to provide my customer with the assurance that they will purchase a product that will work and be effective.	Case 5
		It's true that, I don't know if it's the same in all companies, but because we came from INRIA, initially, we had a reputation that was fairly research-oriented. So we didn't arrive with a finished product right off the shelf. Instead, we had, we call it this way, an internal technological toolbox that is now used to structure products.	Case 1
		It's important to separate into two points, right? When talking about the technical area, we always separate here, the agronomic technical area, from the "tech" [information technology] area, right? So look, if you stop and think, thinking about the co-founders, nobody is a hard coder. I used to program, I have a technology background, but I left the black screen. [...] So from a technical-agronomic point of view, we have a lot of knowledge and a lot of expertise.	Case B
Innovation capabilities	The abilities to "create and commercialize innovative product, service or process technologies that strengthen current business, provide new business ventures, and explore new technology bases" (IGEL; ISLAM, 2001, p. 160).	So, our entire technology roadmap for innovation is rethought every three months. We have a goal in mind of where we want to get, but since the world changes very quickly, we rethink our plan every three months.	Case E
		I think the business model itself already has a great capacity for innovation. I think it's our pursuit. We always look at "what is nobody doing?"; "What is nobody seeing?"; We really seek that.	Case D

		It's first about innovation, with 1/3 of the workforce dedicated to research and about 25 patent families filed since 2013.	Case 3
Execution capabilities	Execution capability is about implementing the validated, adopted growth strategy in just a few larger projects, with a well-defined focus and a project duration of months or years. When much of the implementation risk has been reduced during exploration there can be a longer-term commitment of content and finances both to the startups and to customers and other partners, with the aim of building business (FREYTAG, 2019).	And another thing is execution. It's about planning and executing the plan very well. It's no use having good ideas if we don't have excellent execution. [...] I would say that analyzing the numbers is related to the execution capabilities and to create a strategic plan that you can follow step by step, and this step by step will lead you to the result.	Case D
		We even have our cultural motto: "done before perfect". Go ahead and do it! It's that simple: the execution capability is linked to that. Execute, then we'll see if there's a problem. What matters is not staying on paper, not just thinking [planning]... Go ahead and execute!	Case A
		I have seen in many other start-ups that this was also a point that, perhaps, was hindering development because the founders never forced themselves to take the step, that is, it was always an idea, an idea, an idea, and then the moment when it really becomes a company, they had trouble arriving. So, maybe that's what to look at, yeah.	Case 1
Financial capabilities	The financial capability refers to the ability to secure and utilize financial resources effectively. This encompasses the skills of budgeting and cash flow management, selecting the most appropriate sources of financing, monitoring cost control, analyzing financial statements, and more (BARBERO; CASILLAS; FELDMAN, 2011).	We are investing 80 million reais, took 54 million reais, so we have a counterpart of 26 million reais. But then, thinking about the market, growth, CAPEX, we have a very large volume to make CAPEX. What did we do? We structured capital. Being a new company, without a network with accelerated growth, there is always distrust. So, we have been working with investment funds, banks for 3 years, going there every week, knocking on the door, doing roadshows, showing...	Case A
		We maintain a working capital fund on molecules that are already mastered with an existing portfolio of clients, history, and this allows us to cover fixed expenses, and it's pharmaceutical chemistry, historical assets manufactured in this factory. So financing the ancillary revenues is minor, but it allowed us to finance the development. Next, second step. Develop the pheromone activity, biocontrol while ensuring the survival of the company. So, we need	Case 3

		to be able to pay the fixed expenses, we need to be able to develop new products and finance both.	
		It's that we haven't talked about all the financing, but after the first round of funding, yes, we had 5 rounds of financing. Everything we did there was made possible by capital and debt financing, and grants along the way.	Case 4
HRM Capabilities	Human Resource Management (HRM) capability refers to a company's ability to effectively utilize its HR policies and practices to attract, develop, deploy, and retain a talented workforce (CHUANG; LIU; CHEN, 2015; KAMOCHE, 1996). This encompasses the company's ability to attract and retain the right employees, motivate and manage them, provide socialization and training opportunities, establish fair salary policies, and more (BARBERO; CASILLAS; FELDMAN, 2011).	The personnel, in fact, is quite difficult to find. We can quite easily find personnel, engineers, doctors, but on the other hand, production technicians are still very complicated. It remains very complicated because they don't have the company culture in fact. [...] And that's why I recruited a human resources director, precisely to avoid this turnover in production technician positions.	Case 5
		And then the issue of starting to build a team came up. [...] Bringing, finding people, selecting people, selling the purpose and concept of the business. Not just having someone operational, but someone who is with you, building the concept, the big dream and so on. So this was also very important, this reinvention of management for a technology business, "tech-based". And of course, with difficulties... Difficulty in finding people... We still have difficulties in hiring, retaining. [...] Thank God, we are making progress, we are bringing people and moving forward.	Case B
		I had a problem with employees, the operation was growing a lot. So I went from 109 employees to 320 today. I should end the year with 400 employees. I should reach 700 people by the end of next year to give you an idea. [...] The recruitment and selection process is accelerated, so much so that we have already recruited 300 people this year. [...] My recruitment team has 6 people today, for you to have an idea. We don't do a full cycle recruitment, which is when the same person prospects, interviews, etc. No! We have an employee for each thing.	Case A
Organizational capabilities	Organizational capabilities are the abilities of an organization "to perform a coordinated set of tasks, utilizing organizational resources, for	And when it's a startup, it can't be deliberate. First of all, there's no one to plan, no resources, nothing. So, everything is very emergent. You have to be very fast in terms of changing course all the time. You have few people, so communication is easy. [...] The moment you start structuring teams, you start gaining more processes; you	Case B

	the purpose of achieving a particular end result" (HELFAT; PETERAF, 2003, p. 999).	have to make process. Communication starts becoming more challenging. You start generating more volume, you start growing faster, but you need to structure that and move from a more emergent strategy to a more deliberate strategy. Because otherwise, the areas don't complement each other, understand?	
		I would say that, in our case, speed is a big challenge because we need to grow quickly, but grow structured. So it's a matter of balancing these two things, understand? Growing quickly and with structure are things that we need to do together and they are very complicated. And then, we try every day.	Case D
		[...] that's where we started learning to be 100% remote work, while we were mostly always together. At the start, we had this philosophy a little bit: we are a start-up, we are not many in the start-up, so we try to create a bond in the team and we wanted everyone to spend as much time together as possible so that we create this team cohesion. And then, we learned to work remotely at that time, so it was new processes, it was also organizing team events, meetings where...	Case 1

Source: Elaborated by the Author.
Notes: Cases A through H refer to Brazilian agtechs, while Cases 1 through 8 refer to French agtechs. The original quotes from representatives were translated from Portuguese and French into English for better comprehension and comparison.

This process also allowed us to assess the suitability of knowledge transfer channels from universities and research centers (URCs) for the agtech sector. Contrary to our initial expectations, the empirical evidence indicated that NTBFs generally rely less on URC knowledge than expected. Therefore, we modified the selection criteria for the knowledge transfer channels (KTCs) to be evaluated in the quantitative stage of the research. We established that any KTC with at least two instances of consistent evidence across the analyzed contexts would be included in the study. This adjustment did not negatively impact the quality of the research as the criteria were used for elimination rather than inclusion. By changing the criteria, we were able to maintain a larger pool of KTCs for our analysis.

Out of the 14 proposed channels, we found evidence to include only 8: (a) services and consultancies, (b) joint R&D, (c) joint publications, (d) student placement, (e) researchers in companies, (f) networks, (g) HR training, and (h) NTBF development programs. This conclusion does not mean that other knowledge transfer channels are insignificant, rather it implies that they may not be the most appropriate for the context of agtech companies. Table 9 presents the empirical evidence that supported the decision to investigate these selected KTCs.

Table 9 – Coding process: knowledge transfer channels

Main categories	Concepts	Representative quotes	Organization
Services and consultancies - KTC01	NTBFs seek the assistance of services or consultants when they encounter a problem and wish to implement a pre-existing solution from URCs.	We believe greatly in consulting services. When I speak of "consulting," it's not just consulting from a consultant. I believe a lot in bringing in a professor who is researching [the topic of our interest] to come and provide input into our processes. So today, I have hired the Instituto Paulista de Tecnologia (IPT) to look at my production process and provide input. [...] We are very quick. The researcher suggests and we immediately test it. If it makes sense, it's definitely implemented.	Case A
		And then the third step is consultancy. We have a few experts in pheromones who we use as free consultants and who have consultancy partnerships with us, we have two in particular.	Case 3
Joint R&D - KTC02	NTBFs collaborate with URCs to uncover new insights and develop innovative solutions to tackle existing challenges. By partnering with URCs, NTBFs can access the latest research and knowledge to help them find the most effective solutions to their problems.	And in 2023, our challenge is to work more on laboratory aspects and scientific partnerships with universities. So in 2023, we will really have this relationship in place. We are integrating with SATT.	Case 5
		We had a broad partnership agreement with the university's innovation agency to develop research. It was the only contract we made.	Case E
		So, we bring this very strong and we do a lot of research. Today I don't have time to even think or write my full name, but we foster some research and participate in some things that we understand are very important and we need the university for, you understand? [...] The research added in terms of the operational development of a system that we wanted to implement. The metrics that we developed in this research we brought into the system.	Case D
Joint publications - KTC03	NTBFs invest their efforts in scientific publications in collaboration with URCs in order to gain new insights and legitimacy in their respective industries. By engaging in these joint publications, NTBFs can expand	It was a grant that we won from the government of the state of Ceará. In this grant, we needed to have professors and students studying about the fair market. So we brought in a professor who coordinated a group of PhDs and Masters, who did this research together with us. This research is published. Very cool!	Case D

	their knowledge base and demonstrate their expertise in their field of activity.	We also have collaborators who completed post-graduate studies and published their Master's and PhD theses in our field. Our collaborators completed 12 challenges that we already had within the company, and we are also always cooperating to make publications.	Case A
		Yes, we make publications, and there are publication goals for our researchers as well. And these publications can be in the field of chemistry or agronomy. So here, we are going to make a publication on the life cycle of a canola pest from an agronomic point of view. We have also made publications on chemical syntheses, on formulation, on innovations of all kinds. So yes, it's regular.	Case 3
Student placement - KTC04	Recruiting students is a common practice among NTBFs to acquire specialized skills and knowledge. These young professionals bring with them the knowledge and expertise gained through their academic and scientific pursuits. By hiring students, NTBFs can benefit from the latest advancements and cutting-edge knowledge in their field.	In fact, we are a young company that has operated for a long time in a very technical and specific sector, so the employer brand is important to promote to young graduates. And when doing organic chemistry for plant protection, it's not necessarily sexy, even though biocontrol and the absence of pesticides is a bit sexy, but otherwise organic chemistry is not. So integrating young graduates and teaching them the company culture before recruiting them has been a common practice for us.	Case 3
		So, we were not born within the university. We had this close moment with the university, but today we stay close to the university for a few reasons. First, because we understand that bringing good professionals from an early age and training these people so that they grow with us is very important.	Case D
		This happens a lot! Just to give you an idea, the projects we are closing, we always close with a larger budget to hire [students from the university]... We already say: "dude, who is the student who is going to be a scholarship holder here?" This student takes care of the project and then will come work with us when the project ends. The retention rate is very high for the students who are in their Master's and PhD programs. The project ends, we bring them into the company.	Case A
	The NTBFs occasionally hire professors and researchers from URCs on a temporary basis	Actually, it started as a personal relationship, but now, with all the relationships we have, my innovation director and my HR director	Case 5

Researchers in company - KTC05	to tackle specific problems or develop innovative solutions within their field of activity.	actually reach out to schools, to AgroParisTech, to Montpellier Agro with... and even with INRAE and or organizations like that and actually, they maintain that relationship. That way, if one day, we need to have interns, if we need to have a CIFRE thesis, if we need all that, actually, the ecosystem is ready and we just have to press the button to say: "We have a need".	
		We realized that in order to gain credibility before having revenue, customers, and visibility in the industry, it was important to establish the scientific legitimacy of our expertise and teams. To achieve recognition in this area, we joined forces with many academics, researchers, and international scientists, as they can be prescriptors but, most importantly, it provided a label that validated the M2I researchers as their peers.	Case 3
Networks - KTC06	NTBFs establish networks with URCs to achieve shared objectives and exchange knowlegde and/or information.	And finally, it's true that coming from INRIA has also helped a lot because finally, when we reach the stage where we will go look for our first investors, well, we were already followed by an investment fund that was linked to INRIA and therefore waiting for us to structure the project a little more before putting in the first investment, so to speak. And the fact that there was already a fund following us also facilitated the dialogue with other investment funds that joined the fundraising round that we did. So, it also facilitated the dialogue with investors, the fact of having this already existing link through an investment fund linked to INRIA.	Case 1
		After that, when we really got started, it was just a matter of thinking "OK, how are we going to do it and structure it?" It was mostly about making slides, that is, writing down what we wanted to do and how we wanted to do it, talking to people, meeting with many researchers. I used my networks from Agro Rennes, Paris, INRA, CNRS, and others. Finally, we set up a consortium and won an ANR in late 2011-early 2012, which was really the start.	Case 4
		The network was initially built from an academic perspective. We approached it from that angle, meaning we considered ourselves researchers, as I mentioned before, with a focus on fundamental areas such as research, innovation, and patents.	Case 3

HR training - KTC07	The URCs provide NTBF employees with training and development programs that enhance their knowledge and skills. These programs help to keep NTBF employees updated with the latest information and insights in their field.	Limited. We have training, but it's limited. I think the practical part of the university is still lagging behind. We prefer specialized consultancies, but it's limited. Today it's very limited.	Case A
		So, I would say that's essentially it, I think at the beginning because you don't start a startup with 10 employees right away, you're more likely to be two, the initial founders who create the startup, so there are also all these training programs that help structure and bring complementary knowledge that the founders may not necessarily have.	Case 1
NTBF development programs - KTC08	The URCs provide NTBFs with programs like incubation and acceleration, which help them grow and develop. These programs can provide NTBFs with scientific and practical knowledge, access to networks and resources, physical facilities for operations, and access to research laboratories.	So that was the first thing, and in parallel, I had a very technological profile and so, I did not necessarily have knowledge about the entrepreneurship side at that time. And INRIA also involved me, I was enrolled in training via French Tech, the Poool now in Rennes, on training that was much wider angle and really dedicated to entrepreneurship where we worked, including the questions you had, on business model canvas to clearly target who our customer is, what we want to sell to them, etc., to structure the project finally.	Case 1
		And when we won that plus two more contests and we were taken in an incubator called Agoranov which is one of the oldest start-up incubators in France located in Paris, a public incubator in what they call the Deep techs, in all that is more fundamental technology and not just software.	Case 4
		The university played a crucial role. [...] It was through this support in knowledge, tools, and others, that we were able to achieve our goals. If the incubator did not exist, if the structure we had was not available, our company probably would not exist. We would not be here if we did not have the laboratories to test what we wanted to test... The veterinary staff, the animal husbandry staff... We would not have gotten as far as we have. That is certain.	Case E

Source: Elaborated by the Author.
Notes: Cases A through H refer to Brazilian agtechs, while Cases 1 through 8 refer to French agtechs. The original quotes from representatives were translated from Portuguese and French into English for better comprehension and comparison.

3.4 STEP 3 – TESTING THE CONCEPTUAL FRAMEWORK

In Step 3, we operationalized and tested the model developed in Steps 1 and 2 using a mixed-method approach. This involved designing a questionnaire with objective questions using validated scales from similar contexts. The questionnaire aimed to assess the performance of NTBFs, gauge the development of their ordinary capabilities, and evaluate their reliance on knowledge transfer channels from universities and research centers (URCs) for specialized knowledge. Using this framework, we conducted a cross-country survey to gather empirical data from 50 Brazilian and 59 French agtech companies.

We then performed a Fuzzy Set Qualitative Comparative Analysis (fsQCA) on the gathered data to determine how agtechs configure their ordinary capabilities to improve business performance. fsQCA is a widely used method in business research (e.g. BRENES; CIRAVEGNA; ACUÑA, 2020; COVIN et al., 2020; KAYA et al., 2020) that employs logical techniques such as Boolean algebra, fuzzy-set theory, and logic minimization to provide valuable insights (RAGIN, 2008; RIHOUX; RAGIN, 2009). This technique allowed us to identify different configurations of ordinary capabilities that are equally effective in enhancing NTBF performance in both Brazil and France.

Finally, we used descriptive statistics and Mann–Whitney U tests to determine if agtechs that rely more on URC knowledge have better developed ordinary capabilities and which knowledge transfer channels (KTCs) are most effective. These tests helped us analyze, individually, which modes of knowledge transfer from URCs might be most productive for the development of each type of ordinary capability. These methodological procedures are described in more detail in the following sections.

3.4.1 Constructing the Measurement Model

To measure the proposed theoretical dimensions, we established a measurement framework based on previously validated scales from comparable contexts. The chosen scales were originally published in English, and to be used in our research context, each item was translated into Portuguese and French individually. To ensure the validity of the scales, the translated versions were reviewed by native-speaking researchers in each language. All questions, except demographic questions, were assessed using a 5-point Likert scale, with 1 indicating "strongly disagree" and 5 indicating "strongly agree". We standardized the measurement scales to 5 points as this type of scale has been shown to be less confusing for respondents, leading to a higher response rate and improved response quality (BABAKUS; MANGOLD, 1992; DALMORO; VIEIRA, 2013; DEVLIN; DONG; BROWN, 1993).

The first dimension evaluated in the survey was the knowledge transfer channels (KTCs). We asked agtech entrepreneurs to rate their firm's reliance on each of the 8 KTCs to obtain specialized knowledge (Table 10). This approach was similar to that employed by Alexander and Martin (2013) and Becerra et al. (2019), who used this method to gauge the priority given to each channel by TTO managers from a URC perspective. However, in our study, we opted to assess the perceptions of entrepreneurs, who are in fact the recipients of the transferred knowledge. While our measurement approach mirrored previous studies, focusing on the entrepreneurs' perceptions allowed us to gain a deeper understanding of the actual impact of transferred knowledge outside the URC setting. Recent research has highlighted a disparity in the perceived effectiveness of the support provided by URCs to their entrepreneurs (SCUOTTO et al., 2020).

Table 10 – Measures of Knowledge Transfer Channels (KTCs)

Items	Original concept/scale	Portuguese	French
Services and consultancies - KTC01	A company has a problem and wishes for a “known” solution to be applied to their problem.	Nossa empresa adquire novos conhecimentos por meio da contratação de serviços ou consultorias ofertados por universidades e/ou centros de pesquisa.	Notre entreprise acquiert de nouvelles connaissances en contractant des services ou des services de conseil offerts par des universités et/ou des centres de recherche.
Joint R&D - KTC02	Commercial and academic partners agree to work together to discover new knowledge or to propose solutions solving a problem.	Nossa empresa adquire novos conhecimentos por meio de pesquisa e desenvolvimento (P&D) em parceria com pesquisadores e/ou acadêmicos.	Notre entreprise acquiert de nouvelles connaissances en termes de recherche et le développement (R&D) en partenariat avec des chercheurs et/ou universitaires.
Joint publications - KTC03	Audience of company employees and academics and speakers are taken from both groups.	Nossa empresa adquire novos conhecimentos por meio de publicações conjuntas com pesquisadores e/ou	Notre entreprise acquiert de nouvelles connaissances grâce à des publications conjointes avec chercheurs et/ou

		acadêmicos em eventos e/ou revistas científicas.	personnel universitaire dans des événements et/ou des revues scientifiques.
Student placement - KTC04	Transfer of a graduate into a company partner	Nossa empresa adquire novos conhecimentos por meio da contratação de estudantes para o quadro de colaboradores e/ou estágio.	Notre entreprise acquiert de nouvelles connaissances grâce à l'embauche ou aux stages d'étudiants.
Researchers in company - KTC05	Member of staff is present for a period of time in another organisation.	Nossa empresa adquire novos conhecimentos por meio da contratação de pequisadores e/ou acadêmicos para solucionar um problema específico.	Notre entreprise acquiert de nouvelles connaissances grâce à l'implication des chercheurs et/ou des universitaires pour résoudre un problème spécifique.
Networks - KTC06	Groups of professionals and/or academics come together and meet face-to-face under a banner of common interest or subject discipline	Nossa empresa adquire novos conhecimentos por meio de redes de relacionamento com pesquisadores e/ou acadêmicos, com os quais a equipe da startup se reúne para pensar projetos e/ou soluções que são de interesse comum.	Notre entreprise acquiert de nouvelles connaissances grâce à des réseaux de relations avec des chercheurs et/ou universitaires, avec lesquels l'équipe de la startup se réunit pour réfléchir à des projets et/ou des solutions d'intérêt commun.
HR training - KTC07	Commercial partners keep their professional knowledge up to date with new developments delivered by academics	Nossa empresa adquire novos conhecimentos por meio de treinamentos ofertados a seus colaboradores por acadêmicos e/ou pesquisadores.	Notre entreprise acquiert de nouvelles connaissances grâce aux formations proposées à ses salariés par des universitaires et/ou des chercheurs.
NTBF development programs - KTC08	-	Nossa empresa adquire novos conhecimentos por meio de programas para o desenvolvimento de startups ofertados por universidades e/ou centros de pesquisa, tais como incubação e aceleração.	Notre entreprise acquiert de nouvelles connaissances à travers des programmes de développement de startups proposés par des universités et/ou des centres de recherche, tels que l'incubation et l'accélération.

Source: Elaborated by the Author.

The next step involved assessing ordinary capabilities, beginning with technological capabilities. This was measured using a five-item scale adapted from Deligianni et al. (DELIGIANNI et al., 2019) and Zahra et al. (2007), which has been proven to effectively capture multiple facets of technological capabilities (ZAHRA; NEUBAUM; LARRAÑETA, 2007). However, two measures were redesigned as they were not appropriate for the research context. This was done by taking into account the evidence gathered from the interviews in Step 2. The newly designed items were reviewed by expert researchers in the field of strategic management (Table 11).

Table 11 – Measures of technological capabilities

Items	Original concept/scale	Portuguese	French
TEC01	*These measures were revised based on the evidence collected in Step 2.*	Nossa equipe possui um alto nível de conhecimento técnico relacionado ao setor de atuação da empresa (core business).	Notre équipe possède un haut niveau de connaissances techniques liées au secteur d'activité de l'entreprise (core business).
TEC02		Nossa equipe possui um alto nível de conhecimento sobre sistemas e tecnologias da informação (TI) que são necessários ao desenvolvimento dos produtos e/ou serviços que ofertamos.	Notre équipe possède un haut niveau de connaissance des systèmes et technologies de l'information (TI) nécessaires au développement des produits et/ou services que nous proposons.
TEC03	Our firm is able to upgrade existing products and/or services.	Nossa empresa tem atualizado seus produtos e/ou serviços frequentemente.	Notre entreprise a fréquemment mis à jour ses produits et/ou services.
TEC04	Our firm has capacity and efficiency in developing new products and/or services.	Nossa empresa tem desenvolvido eficientemente novos produtos e/ou serviços.	Notre entreprise a développé efficacement de nouveaux produits et/ou services.
TEC05	Our firm is able to conduct R&D activities by improving knowledge and skills.	Nossa empresa tem conduzido atividades de pesquisa e desenvolvimento (P&D) por meio do aprimoramento de conhecimentos e habilidades da equipe.	Notre entreprise a mené des activités de recherche et développement (R&D) à travers l'amélioration des connaissances et des compétences du personnel (par exemple, formation).

Source: Adapted from Deligianni et al. (DELIGIANNI et al., 2019) and Zahra et al. (2007).

To evaluate marketing capabilities, we utilized a seven-item scale adapted from Ahmadi and O’Cass (AHMADI; O’CASS, 2018) and Barbero et al. (2011). These items encompass abilities in areas such as planning, selling, pricing, seeking new growth opportunities, understanding customers, and more (Table 12). Additionally, we created a unique measure based on the evidence gathered in Step 2 to assess the efficiency of agtechs in communicating their products and/or services to their markets. This structure is appropriate for the context of NTBFs as it addresses the critical aspect of first product marketing.

Table 12 – Measures of marketing capabilities

Items	Original concept/scale	Portuguese	French
MKT01	Customer knowledge	Nossa empresa possui um alto nível de conhecimento sobre as demandas reais dos clientes e dos mercados onde atua.	Notre entreprise possède un haut niveau de connaissance des demandes réelles des clients et des marchés où elle opère.
MKT02	Market orientation and ability to forge relationships and alliances	Nossa empresa responde as necessidades do mercado de forma rápida e eficiente, entregando valor superior aos seus clientes.	Notre entreprise répond aux besoins du marché rapidement et efficacement, avec une offre de valeur supérieure pour ses clients.
MKT03	Pricing accurately	Nossa empresa é eficiente na precificação de seus produtos e/ou serviços, considerando os diversos segmentos de mercado e modelos de atuação (B2B, B2C, B2G etc.).	Notre entreprise est efficace dans la precification de ses produits et/ou services, compte tenu des différents segments de marché et modèles opérationnels (B2B, B2C, B2G, etc.).
MKT04	Salesforce	Nossa empresa possui uma força de vendas ativa e estruturada.	Notre entreprise dispose d'une force de vente active et structurée.
MKT05	*This measure was created based on the evidence collected in Step 2.*	Nossa empresa é eficiente na comunicação de seus produtos e/ou serviços aos seus clientes.	Notre entreprise est efficace dans la communication de ses produits et/ou services à ses clients.
MKT06	Adequate strategy	Nossas estratégias de captação e retenção de clientes são eficientes.	Nos stratégies d'acquisition et de fidélisation de la clientèle sont efficaces.
MKT07	Search of new opportunities to grow	Nossa empresa tem buscado novas oportunidades de mercado para crescer.	Notre entreprise a recherché de nouvelles opportunités de marché pour se développer.

Source: Adapted from Ahmadi and O’Cass (AHMADI; O’CASS, 2018) and Barbero et al. (2011).

Innovation capabilities were assessed using a five-item scale (Table 13) adapted from Gupta et al. (2021) and Calantone et al. (2002). This scale measures various dimensions of innovation, including innovation in processes, the team's creativity potential, and tolerance for risk. This tool has proven to be effective across different contexts and has demonstrated high psychometric levels in recent research (e.g., FANG et al., 2021; LIN, 2007). Additionally, based on the evidence gathered in

Step 2, we added an item to assess the company's ability to test new customer segments and/or markets, which is crucial for ensuring business scalability.

Table 13 – Measures of innovation capabilities

Items	Original concept/scale	Portuguese	French
INN02	Our firm is creative in its methods of operation	Nossa empresa é criativa em seus métodos de operação e nas suas rotinas.	Notre entreprise est créative dans ses modes de fonctionnement et dans ses routines.
INN03	Our firm tries out new ways to do things	Nossa empresa experimenta frequentemente novas maneiras de fazer as coisas.	Notre entreprise expérimente souvent de nouvelles manières de faire.
INN05	Our firm is often the first to market with new products and services	Nossa empresa é frequentemente considerada a pioneira em lançar novos produtos e/ou serviços.	Notre entreprise est souvent considérée comme pionnière en termes de lancement de nouveaux produits et/ou services.
INN06	*This measure was created based on the evidence collected in Step 2.*	Nossa empresa frequentemente testa novos segmentos de clientes e/ou mercados.	Notre entreprise teste fréquemment de nouveaux segments de clientèle et/ou marchés.
INN07	Innovation in our firm is perceived as too risky and is resisted.	Nossa empresa é capaz de lidar com os riscos e incertezas típicos de atividades de inovação.	Notre entreprise est en mesure de faire face aux risques et aux incertitudes propres aux activités d'innovation.

Source: Adapted from Gupta et al. (2021) and Calantone et al. (2002).

To measure the level of networking capabilities, we adapted a five-point scale from X. Chen et al. (2009). This scale assesses the ability to initiate, maintain, and leverage relationships with other organizations (Table 14). Additionally, it has been proven to be effective in evaluating networking capabilities in the context of new high-technology companies.

Table 14 – Measures of networking capabilities

Items	Original concept/scale	Portuguese	French
NET02	Our firm is able to analyze what we would like to achieve with which collaborators.	Nossa empresa avalia antecipadamente o que pretende obter com cada parceiro de sua rede de negócios.	Notre entreprise évalue au préalable ce qu'elle entend obtenir avec chaque partenaire de son réseau d'affaires.
NET03	Our firm is able to rely on close individual relationships to secure personnel and financial resources.	Nossa empresa utiliza os relacionamentos pessoais próximos para captar recursos financeiros, humanos e/ou tecnológicos, de forma a complementar os nossos recursos internos.	Notre entreprise utilise des relations personnelles étroites pour capter des ressources financières, humaines et/ou technologiques, afin de compléter nos ressources internes.
NET05	Our firm is able to discuss with collaborators regularly on how to support each other to achieve success.	Nossa empresa discute regularmente com seus parceiros estratégicos sobre como apoiar uns aos outros para o alcance de objetivos comuns.	Notre entreprise discute régulièrement avec ses partenaires stratégiques de la manière de se soutenir mutuellement dans la réalisation d'objectifs communs.
NET06	Our firm is able to deal flexibly with our collaborators.	Nossa empresa possui flexibilidade no relacionamento com seus parceiros.	Notre entreprise fait preuve de souplesse dans la relation avec ses partenaires.
NET07	Our firm is able to solve problems constructively with our collaborators.	Nossa empresa resolve os problemas de forma colaborativa e construtiva com seus parceiros.	Notre entreprise résout les problèmes de manière collaborative et constructive avec ses partenaires.

Source: Adapted from X. Chen et al. (2009).

Despite the crucial role played by Human Resource Management (HRM) capabilities in the success of NTBFs, the available options for measuring these capabilities are limited, as there have been few studies dedicated to HRM analysis in this context. To address this gap, we adapted a six-item scale from Barbero et al. (2011), who evaluated HRM capabilities in high-growth SMEs, a context similar to that of NTBFs. This measurement captures key aspects of organizational culture, talent attraction and retention, and provision of adequate training and incentives to the team (Table 15). Additionally, based on the evidence gathered from the interviews conducted in Step 2, we developed an additional measure to assess the level of complementarity among partners. This complementarity is critical in the early stages of a business as it ensures a diverse range of skills and experiences within the management team.

Table 15 – Measures of HRM capabilities

Items	Original concept/scale	Portuguese	French
HRM01	*This measure was created based on the evidence collected in Step 2.*	Os sócios da empresa foram selecionados considerando a complementariedade de competências dos mesmos.	Les associés de l'entreprise ont été sélectionnés en fonction de leurs compétences complémentaires.
HRM02	Organizational culture aligned with company interests	A cultura organizacional está alinhada aos objetivos e interesses da empresa.	La culture organisationnelle est alignée avec les objectifs et les intérêts de l'entreprise.
HRM03	Attraction of talents	Nossa empresa tem conseguido atrair novos talentos alinhados com a cultura e os objetivos do negócio.	Notre entreprise a réussi à attirer de nouveaux talents alignés avec la culture organisationnelle et les objectifs commerciaux.
HRM04	Adequate training for employees.	Nossa empresa oferece treinamento adequado aos seus colaboradores.	Notre entreprise offre une formation adéquate à ses employés.
HRM05	Incentives to personnel aligned with company objectives.	Nossa empresa oferece incentivos atrativos (remuneração, plano de carreira etc.) aos seus colaboradores, alinhados aos objetivos estratégicos do negócio.	Notre entreprise propose des incitations attractives (rémunérations, plan de carrière, etc.) à ses collaborateurs, alignées avec les objectifs stratégiques de l'entreprise.
HRM06	Retention of talents	Nossa empresa tem conseguido reter os talentos necessários, por meio de diretrizes e incentivos alinhados à estratégia do negócio.	Notre entreprise a réussi à retenir les talents nécessaires grâce à des directives et des incitations alignées avec la stratégie commerciale.

Source: Adapted from Barbero et al. (2011).

Considering that the organizational capabilities dimension emerged from our empirical findings and not from the literature review, we selected a scale that was conceptually aligned with the assumptions that arose from the empirical data. To do this, we relied on the work of Barbero et al. (2011). We adapted a six-item scale from their research, which measures the adequacy of the NTBF's organizational structure, their ability to develop strategic plans, and their ability to implement and execute routines and technologies for monitoring these plans. Additionally, we added a measure to assess the use and efficiency of performance indicators, recognizing that simply implementing these indicators is not enough, but the quality and effectiveness of the monitoring mechanisms must also be evaluated (Table 16).

The measurement of financial capabilities was approached similarly to the measurement of organizational capabilities, as the phenomenon of financial capabilities in the context of NTBFs is understudied and limited options for appropriate scales were available. Most previous studies in this area view financial resources simply as a means rather than as a strategic capability. To address this, we adapted a five-item scale from Barbero et al. (2011) that not only evaluates the internal availability of financial resources, but also the methods by which NTBFs obtain and leverage these resources. Based on the evidence from Step 2, we added a question to assess the level of planning related to the business's capital structure, forecasting for new rounds of investment, and the desired sources of capital (Table 17).

Table 16 – Measures of organizational capabilities

Items	Original concept/scale	Portuguese	French
ORG01	Adequate organizational structure	Nossa empresa possui uma estrutura organizacional bem definida, com uma distribuição eficiente de pessoas, processos e responsabilidades.	Notre entreprise a une structure organisationnelle bien définie, avec une répartition efficace des personnes, des processus et des responsabilités.
ORG03	Adequate strategic planning	Nossa empresa possui um planejamento consistente com a estratégia organizacional, com planos de ação e metas detalhados por setor ou unidade do negócio.	Notre entreprise dispose d'une stratégie clairement définie, avec des plans d'action et des objectifs détaillés par secteur ou business unit.
ORG04	Existence and communication of a mission and vision	Nossa empresa possui uma proposta de valor bem definida, a qual é comunicada de forma efetiva a todos os colaboradores e clientes.	Notre entreprise a une proposition de valeur bien définie, qui est communiquée efficacement à tous les employés et clients.
ORG05	Introduction of control mechanisms	Nossa empresa possui mecanismos de controle eficientes (por exemplo, sistemas de gestão, indicadores de desempenho e monitoramento), que permitem a gestão dos objetivos estabelecidos.	Notre entreprise dispose de mécanismes de contrôle efficaces (par exemple, des systèmes de gestion, des indicateurs de performance et de suivi), qui permettent la gestion des objectifs établis.
ORG06	*This measure was created based on the evidence collected in Step 2.*	Os indicadores monitorados em nossa empresa nos permitem tomar decisões mais assertivas.	Les indicateurs suivis dans notre entreprise nous permettent de prendre des décisions plus affirmées.
ORG07	Introduction of technology able to improve efficiency	Nossa empresa tem introduzido tecnologias capazes de melhorar a gestão e a eficiência do negócio.	Notre entreprise a introduit des technologies capables d'améliorer la gestion et l'efficacité de l'entreprise.

Source: Adapted from Barbero et al. (2011).

Table 17 – Measures of financial capabilities

Items	Original concept/scale	Portuguese	French
FIN02	Budgeting and cashflow management	Nossa empresa possui uma gestão eficiente de orçamento e fluxo de caixa, com previsão de receitas e despesas baseadas na projeção de crescimento do negócio.	Notre entreprise a une gestion efficace du budget et de la trésorerie, avec des prévisions de revenus et de dépenses basées sur la projection de croissance de l'entreprise.
FIN03	Financial reporting process	Nossa empresa possui um sistema robusto de demonstrações financeiras, o qual permite compreender com precisão a atual situação financeira do negócio.	Notre entreprise dispose d'un système fiable d'états financiers, ce qui nous permet de comprendre avec précision la situation financière actuelle de l'entreprise.
FIN04	Analysis of the financial statements	Os demonstrativos financeiros da nossa empresa são importante balizadores das tomadas de decisões.	Les états financiers de notre entreprise sont des guides importants pour la prise de décision.
FIN05	Availability of financial capital	Nossa empresa possui capital financeiro suficiente para financiar suas atividades operacionais (cash burn).	Notre entreprise dispose d'un capital financier suffisant pour financer ses activités opérationnelles (cash burn).
FIN06	*This measure was created based on the evidence collected in Step 2.*	Nossa empresa possui um planejamento de estruturação do capital para o crescimento do negócio, considerando as próximas rodadas de investimentos e as fontes de capital almejadas.	Notre entreprise dispose d'un plan de structuration du capital pour la croissance de l'entreprise, compte tenu des prochains cycles d'investissement et des sources de capital souhaitées.

Source: Adapted from Barbero et al. (2011).

Regarding the measurement of execution capabilities, we have considered the relatively new nature of this subject within the field of scientific management literature. To the best of our knowledge, there are no established and validated scales available for assessing this specific phenomenon. Consequently, we have developed a set of measures for evaluating execution capabilities, given that it has evolved as an emerging concept based on our empirical research.

The development of this scale was based on the evidence obtained during interviews conducted with the identified success cases in Step 2. The concept of execution capabilities arose during these interviews. Entrepreneurs were prompted with the following question: *"Could you elaborate on what you mean by execution capabilities? Can you provide examples of situations that highlight your firm's* *execution capabilities?"* For instance, the excerpts provided below exemplify the type of evidence transcribed in the thesis manuscript and subsequently employed in the development of the scale:

> And another thing is execution. It's about planning and executing the plan very well. It's no use having good ideas if we don't have excellent execution. [...] I would say that analyzing the numbers is related to the execution capabilities and to create a strategic plan that you can follow step by step, and this step by step will lead you to the result" (CEO – Case D, translated from Portuguese to English).
>
> "We even have our cultural motto: "done before perfect". Go ahead and do it! It's that simple: the execution capability is linked to that. Execute, then we'll see if there's a problem. What matters is not staying on paper, not just thinking [planning]... Go ahead and execute"! (CEO – Case A, translated from Portuguese to English).
>
> "I have seen in many other start-ups that this was also a point that, perhaps, was hindering development because the founders never forced themselves to take the step, that is, it was always an idea, an idea, an idea, and then the moment when it really becomes a company, they had trouble arriving. So, maybe that's what to look at, yeah" (CEO – Case 1, translated from French to English).

The initial version was then reviewed and validated by experts, including researchers and entrepreneurs. After incorporating their feedback, we arrived at the final version of the scale, which consists of 4 items (Table 18). These items measure the NTBF team's ability to (a) translate ideas into action plans and execute them, (b) monitor ongoing actions and make necessary realignments, (c) achieve planned targets, and (d) meet planned delivery deadlines. It is important to underscore that the scale's validity has been evaluated with some limitations, primarily stemming from the relatively small sample size employed in this study. This limitation represents a significant constraint in our research.

Finally, in order to ensure the accurate assessment of NTBF performance, our measurement model incorporates five items (as detailed in Table 19) that encompass the dimensions of organizational performance and operational performance as recommended by Hamann et al. (2013). It is important to note that while the literature in this field is fragmented and there is no consensus on how firm performance should be measured (e.g., KIVILUOTO, 2013), this set of measures is designed to provide a well-rounded evaluation of NTBF performance. Moreover, these measures are widely employed in recent research for assessing NTBF performance.

Table 18 – Measures of execution capabilities

Items	Original concept/scale	Portuguese	French
EXC01	*These measures were created based on the evidence collected in Step 2.*	Nossa equipe é capaz de traduzir boas ideias em planos de ações e executá-los de forma efetiva.	Notre équipe est capable de traduire de bonnes idées en plans d'action et de les exécuter efficacement.
EXC03		Nossos indicadores e/ou métricas são acompanhados frequentemente e ações imediatas são tomadas para o realinhamento do negócio, quando necessário.	Nos indicateurs et/ou métriques sont fréquemment suivis et des actions immédiates sont prises pour réaligner l'activité, si nécessaire.
EXC04		As metas estabelecidas nos planos de ação estão sendo alcançadas consistentemente.	Les objectifs définis dans les plans d'action sont régulièrement atteints.
EXC05		Em geral, nossa equipe cumpre os prazos de entrega das ações planejadas.	De manière générale, notre équipe respecte les délais de livraison des actions prévues.

Source: Elaborated by the Author.

Table 19 – Measures of firm performance

Items	Original concept/scale	Portuguese	French
PER01	Profit	Nos últimos três anos, nosso lucro líquido aumentou.	Au cours des trois dernières années, notre revenu net a augmenté.
PER02	Turnover	Nos últimos três anos, nosso volume de vendas aumentou.	Au cours des trois dernières années, notre volume de ventes a augmenté.
PER03	Valuation	Nos últimos três anos, nosso valor de mercado aumentou (valuation).	Au cours des trois dernières années, notre valeur de marché a augmenté (valuation).
PER04	Innovation performance	Nos últimos três anos, aumentou a proporção de vendas de produtos novos em relação as vendas totais da empresa.	Au cours des trois dernières années, la proportion des ventes de nouveaux produits par rapport aux ventes totales de l'entreprise a augmenté.
PER05	Employment	Nos últimos três anos, nossa empresa aumentou o número de colaboradores.	Au cours des trois dernières années, notre entreprise a augmenté son effectif.

Source: Adapted from Atuahene-Gima et al. (2006), Zheng et al. (2010), Ahmadi et al. (2014), Parida et al. (2017), Behl (2022), Ramírez-Alesón and Fernández-Olmos (2018), and Sedita et al. (2019).

The questionnaire included questions about entrepreneurs' perceptions on the firm's growth in sales volume (BEHL, 2022; PARIDA et al., 2017), net earnings (ATUAHENE-GIMA; LI; DE LUCA, 2006; BEHL, 2022), firm valuation (ZHENG; LIU; GEORGE, 2010), and employment (BERTONI; COLOMBO; GRILLI, 2013; COLOMBO; GIANNANGELI; GRILLI, 2013). Additionally, we also assessed their perceptions on the firm's innovation performance (RAMÍREZ-ALESÓN; FERNÁNDEZ-OLMOS, 2018; SEDITA et al., 2019).

Our measurement framework, implemented on the secure and cost-effective online survey platform, Google Forms, brings together these measures to effectively collect and store research data. To accommodate the language preferences of the respondents in Brazil and France, two separate links were created, one in Portuguese and one in French. In addition to the questions outlined in the measurement framework, supplementary questions were added to the end of the survey to gain a more in-depth understanding of the respondents and their firms.

The survey collected information on the respondent's gender identity, current age, level of education, and role within the firm (founder, manager, or both). The firm's profile was evaluated by inquiring about the location of the company's headquarters, year of establishment, size (in terms of number of employees), sources of financial capital (banks, investors, etc.), current stage of the business (seed, early-stage, growth, or scale-up), and participation in incubation or acceleration programs offered by universities or research centers.

Respondents had the option, on a voluntary basis, to provide their contact email if they wished to receive a report with the research results at the conclusion of the thesis. To maintain confidentiality, all information that could potentially identify the respondent was anonymized. The collected data was used exclusively for descriptive analysis of the profile of entrepreneurs and their firms. In the following section, we outline our approach to gather data using the established measurement framework.

Furthermore, regarding the reliability of the scales employed and, consequently, the validity of the results, it is crucial to assess the reliability of these measurement tools. To address this concern, we utilized Cronbach's alpha, as recommended by Hair Jr. et al. (2010). Given we utilized identical scales in both Brazil and France, we performed the Cronbach's alpha tests using the entire dataset, which includes cases from both countries. The results of this assessment are presented in Table 20.

Table 20 – Measurement Reliability: Cronbach's Alpha Test

Construct	α
Technological capabilities	0.574
Marketing capabilities	0.823
Innovation capabilities	0.691
Networking capabilities	0.670
HRM capabilities	0.721
Organizational capabilities	0.843
Financial capabilities	0.709
Execution capabilities	0.732
Performance	0.795

Source: Elaborated by the Author.

These alpha indicators provide confirmation of the validity of our measurements, even within the constraints of our sample limitations. Notably, Hair Jr. et al. (2010) recommend a general guideline for multivariate analyses, which suggests having at least five times more observations than the number of variables under consideration, with a more preferable ratio closer to ten to one. Given these constraints, our scale reliability results remain satisfactory. Typically, Cronbach's alpha values falling within the range of 0.6 to 0.7 (or higher) are considered acceptable.

It's worth noting that the 'Technological Capabilities' construct exhibited a Cronbach's alpha just slightly below the threshold of 0.60. Following the approach advocated by Hair et al. (2010, p. 137–139), we have opted to retain the original construct, albeit with acknowledgment of its slightly lower reliability. Additionally, it's important to recognize that this marginal decrease in reliability could be attributed in part to the limitations imposed by our sample size.

Furthermore, we conducted a normality assessment of the data using the Kolmogorov–Smirnov test (HAIR JR. et al., 2010). As shown in the results presented in Table 21, our data does not conform to a normal distribution pattern, which is not uncommon given the research context and sample size. Consequently, this outcome suggests that multivariate tests should be conducted using non-parametric methods.

In the context of our research, this result guides the selection of appropriate tests for evaluating differences in means and correlations. It's important to note, however, that the non-normality of the data does not impact the analyses performed using the fsQCA method (FISS, 2011).

Table 21 – Tests of Normality

Construct	Kolmogorov-Smirnov[1]		
	Statistic	df	Sig.
Technological capabilities	0.135	100	0.000
Marketing capabilities	0.133	100	0.000
Innovation capabilities	0.116	100	0.002
HRM capabilities	0.136	100	0.000
Organizational capabilities	0.134	100	0.000
Financial capabilities	0.142	100	0.000
Execution capabilities	0.155	100	0.000
Performance	0.177	100	0.000

Source: Elaborated by the Author.
Note: [1]Lilliefors Significance Correction.

3.4.2 Data collection

Before beginning the data collection process, we developed a research protocol that outlined criteria for the appropriate selection of the research target audience. As stated in Step 2, the agtechs selected for the research needed to meet the following criteria: (a) having an innovative, repeatable, scalable, and profitable business model (BLANK; DORF, 2012; RIES, 2011), (b) being independent and not affiliated with a corporate group (SPENCE; CRICK, 2006), (c) having fewer than 250 employees (EUROSTAT, 2020; GARCÍA-CABRERA; GARCÍA-SOTO; OLIVARES-MESA, 2019), and (d) being less than 10 years old at the time of the survey (AMEDOFU; ASAMOAH; AGYEI-OWUSU, 2019). To ensure the accuracy of this information, all agtechs in our database were thoroughly vetted by conducting research on the companies' websites and stakeholders, such as incubators, accelerators, investors, etc.

Furthermore, to be considered an eligible case for the study, the firms were required to have demonstrated consistent growth over the past three years, either in terms of sales or employees, or have secured at least one round of investment. This criterion was used to ensure the selection of agtechs that were in the growth or scale-up phase. Seed or early-stage agtechs were excluded from the study, as these newer firms typically lack well-developed capabilities and are not yet operating on a regular basis. Once an agtech satisfied all the criteria outlined in the research protocol, it was added to our database as a potential target for the study.

The initial survey was sent to the Chief Executive Officer (CEO) of selected agtech companies. This decision was made because the CEO, as the top manager of the business, is likely to have the most comprehensive and accurate information about the firm. The CEO's perceptions can be seen as more trustworthy, providing a closer representation of the "truth" (NORDIN et al., 2018; SHARFMAN, 1998). If a response was not received from the CEO, a follow-up survey was sent to another senior executive of the agtech, typically the second-highest ranking manager such as the Chief Operating Officer (COO), Chief Technology Officer (CTO), or Chief Marketing Officer (CMO). To accurately identify these individuals, we used information available on the firm's website and social media platforms, such as LinkedIn. Strict adherence to these criteria was maintained throughout the data collection process in both Brazil and France.

To initiate the data collection process in Brazil, we conducted an initial mapping of all existing agtechs in the country. This was accomplished by conducting research on the publication "Radar Agtech," which is the most comprehensive mapping of agtechs in Brazil, which identified 1574 agtechs. Furthermore, this information was cross-referenced with data available on the website of the Associação Brasileira de Startups (ABStartups). Only those agtechs that met the criteria outlined in the research protocol were included in our database for further analysis.

To increase participation in the research among Brazilian agtechs, we employed a multi-faceted approach. Firstly, as an incentive to participate, we offered a complimentary technical report summarizing the research results, which would be made available after the successful defense of the thesis. In addition, to further encourage participation, we conducted follow-up phone calls to the agtechs. Our outreach efforts to agtech entrepreneurs through different channels and networks in Brazil were successful, leading to a high level of engagement and ultimately resulting in 51 valid responses for our study.

To conduct the initial mapping of agtechs in France, we started by identifying the various innovation hubs and associations in the agribusiness sector. This included organizations such as Polo Valorial, which is an innovation hub for the agri-food chain in Brittany, Village-by-CA, a network of business acceleration offices with a focus on agtechs, and La Ferme Digitale, a French association of agtechs. We used the information available on the websites of these and other agribusiness innovation clusters to compile our initial list of agtechs for data collection. However, as previously stated, only agtechs that met the established criteria were added to our database for further analysis.

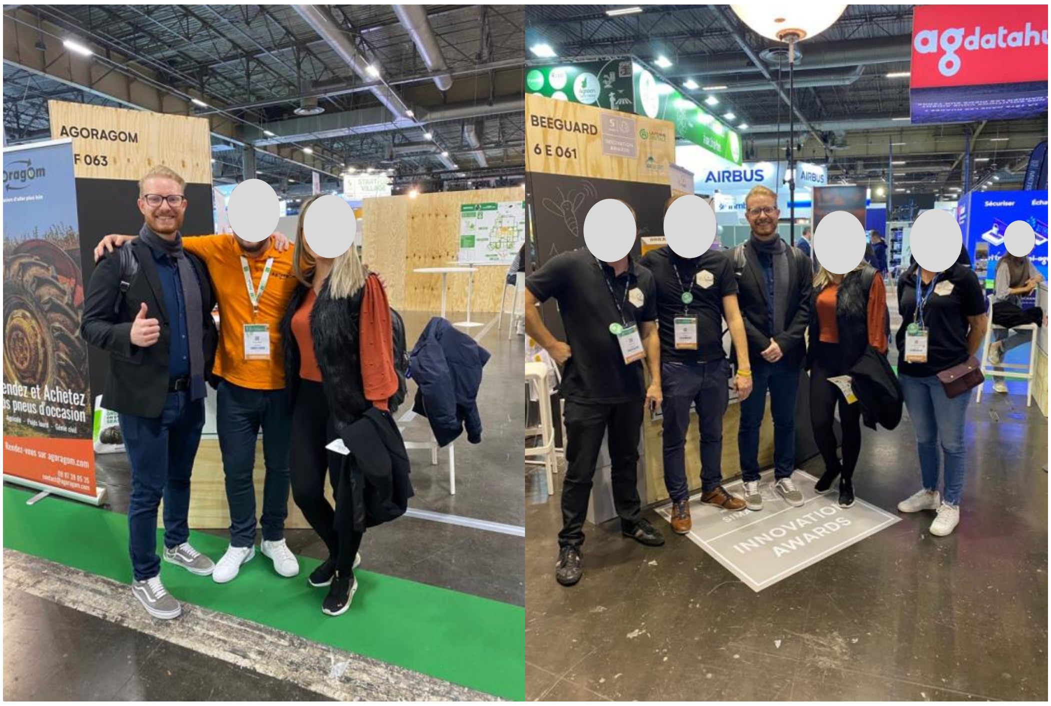
To encourage participation in the research in France, we also offered the complimentary technical report as an incentive to participants. Additionally, to reach a larger audience, we conducted face-to-face visits to innovation habitats in Paris, where the majority of French agtechs are located. During these visits, we engaged with the managers and coordinators of these habitats (see Figure 3), presenting the research, and seeking their support in promoting the survey to the agtechs within their network. We also received referrals for potential participants from some of these supporters. In total, 11 innovation habitats were visited in person during this stage.

Figure 3 – Personal visits to innovation habitats in Paris

Source: Researcher's personal archive.
Notes: To maintain the confidentiality of all parties involved, the participants' faces were deliberately blurred.

Furthermore, we also participated as students in the SIMA Fair in Paris, France's largest innovation fair for the agribusiness sector. This opportunity provided us with a platform to present our research and expand our network of contacts. Over the course of 5 days, we personally engaged with over 70 agtech entrepreneurs (see Figure 4) and received their personal contacts for future outreach efforts. Our face-to-face interactions with French agtech entrepreneurs revealed a strong reliance on LinkedIn for professional networking. This insight motivated us to cultivate relationships with agtech entrepreneurs throughout France using LinkedIn. This strategy proved to be effective in expanding our pool of potential contacts and we were able to reach over 180 entrepreneurs through this platform and send them our survey invitation. Our engagement strategies with French agtech entrepreneurs ultimately resulted in 59 valid responses for our study.

Figure 4 – Personal visits to entrepreneurs at SIMA Fair in Paris



Source: Researcher's personal archive.
Notes: To maintain the confidentiality of all parties involved, the participants' faces were deliberately blurred.

3.4.3 Sample summary

As outlined in the previous section, despite the concerted efforts and the methodological procedures aimed at encouraging participation and obtaining more extensive data, our research ultimately gathered data from 51 cases in Brazil and 59 cases in France. However, during the data analysis, we identified some cases that did not conform to the established research protocol. In Brazil, we excluded two agtech firms that had been in operation for over 10 years at the time of data collection. In

France, we eliminated four agtech firms for the same reason, as well as two agtech firms with administrative headquarters located outside of France and three agtech firms that showed insufficient evidence of business growth. Therefore, the final sample consists of 48 agtech firms in Brazil and 52 in France (Figure 5).

It is noteworthy that despite recent studies employing QCA within larger samples (e.g., BEYNON; JONES; PICKERNELL, 2020; COVIN et al., 2020), this method remains well-suited for small- and medium-sized samples, as in our case. QCA proves particularly effective for analyzing complex combinations of factors in research settings with smaller sample sizes, with a recommended range of 10 to 50 cases (GRECKHAMER; MISANGYI; FISS, 2013).

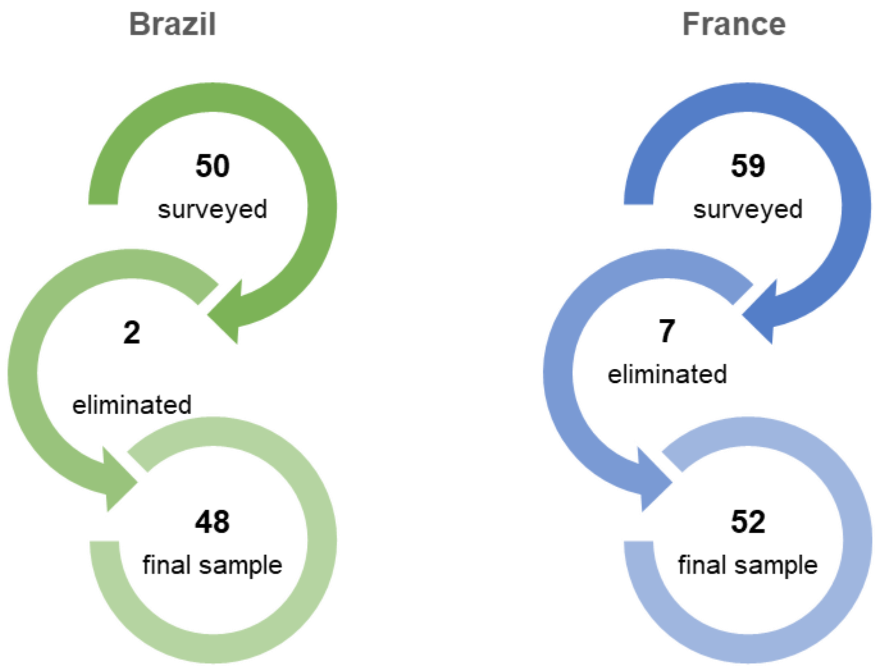
It is crucial to underscore that, in opting for smaller samples in both Brazil and France, we recognize the potential for limited diversity. This limitation arises from the restricted pool of available cases during the data collection period, which indicated the existence of approximately 250 agtech firms in the entire country of France (EURACTIV, 2020). Furthermore, only about 20% of these agtechs managed to progress to the growth or scale phases (EU-STARTUPS, 2021), amounting to approximately 50 agtechs. Given that our research exclusively centered on growing or scaling agtechs, our sample of 52 cases in France is appropriate. In the case of the Brazilian sample, we aimed for a similar quantity to maintain balance between the two samples.

In Brazil, 10% of NTBFs manage to survive beyond their first two years since foundation (INNOVATION LATAM, 2022). Additionally, data from the Brazilian Startup Association reveals that only 3.4% of these ventures achieve consistent revenue, falling within the range of R$500,000 to R$1 million (ABSTARTUPS, 2020). Given the estimated total of 1,574 agtech firms in the country (FIGUEIREDO; JARDIM; SAKUDA, 2021), it can be inferred that roughly 54 agtechs are currently in the growth or scaling phase. In this context, the sample of 48 agtechs obtained for this research holds substantial relevance.

In Brazil, our data indicates that the majority of agtech firms are situated in the southern, southeastern, and midwestern regions, with no responses received from firms located in the north and northeast regions. These findings are consistent with Radar Agtech (FIGUEIREDO; JARDIM; SAKUDA, 2021), which provides the most comprehensive mapping of agtechs in Brazil. This mapping highlights that most

Brazilian agtech firms are based in the same areas where we received responses. Figure 6 displays the geographical distribution of our Brazilian sample.

Figure 5 – Sample summary



Source: research data.

Figure 6 – Geographic representation of Brazilian agtechs on a map

Source: elaborated from the research data.

In France, most of the agtech firms in our sample are concentrated in Paris or surrounding innovation clusters dedicated to agribusiness, such as Pôle Valorial and Pôle Agri Sud-Ouest Innovation (MAA, 2020). These clusters offer a supportive environment for agribusiness innovation, complemented by the historical significance of agriculture and livestock in these regions, which promotes the emergence and growth of agtechs. Figure 7 depicts the geographic distribution of our sample in France.

To gain a comprehensive understanding of the agtech firms surveyed in Brazil and France, we collected and analyzed data on various aspects of their profile, including the size of the firms (measured by the number of employees), the age of the firms (in years since the foundation of the business), their current business phase (growth or scale-up), participation in development programs (incubation and/or acceleration), their position in the supply chain of the agribusiness industry, and their sources of capital. This information allowed us to build a detailed profile of the agtech firms and gain valuable insights into the unique characteristics and challenges of the agtech ecosystem in both countries.

Figure 7 – Geographic representation of French agtechs on a map

Source: elaborated from the research data.

Regarding the size of the agtech firms, although our sample of agtech firms consisted of small and medium-sized enterprises (SMEs), we found that the majority of the firms were small companies. Specifically, 95.8% of agtech firms in Brazil had up to 50 employees, while in France, the corresponding figure was 90.4% (Table 22). The average size of agtech firms in Brazil was 24.5 employees, slightly higher than the average size of agtech firms in France, which was 23.0 employees. This finding suggests that, on average, successful Brazilian agtech firms may have slightly larger teams than their French counterparts.

Table 22 – Firm's size

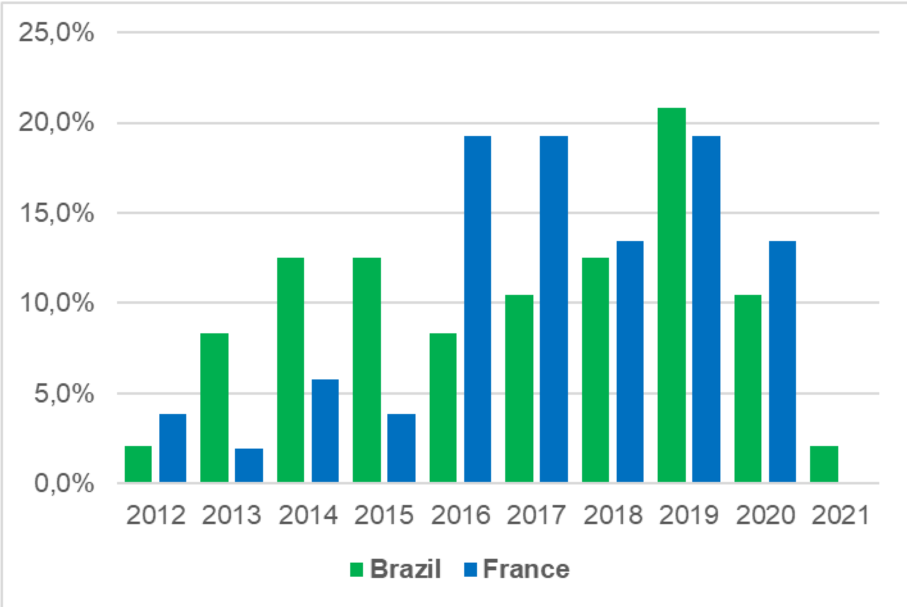
Firm size	**Brazil**		**France**	
	N	**%**	**N**	**%**
Up to 10 employees	12	25,0%	18	34,6%
11 to 50 employees	34	70,8%	29	55,8%
51 to 100 employees	0	0,0%	5	9,6%
More than 100 employees	2	4,2%	0	0,0%
Mean firm size	**24,5 employees**		**23,0 employees**	

Source: research data.

In terms of the age of the analyzed firms, our analysis showed that the average age of successful Brazilian agtech firms was 5.21 years, slightly higher than the French agtech firms, which had an average age of 4.79 years. This finding suggests that Brazilian agtech firms may take longer to develop their businesses. As shown Figure 8, a higher proportion of Brazilian agtech firms fall within the older foundation year ranges (2012 to 2016). The reason for this trend could be related to several factors, such as the fact that Brazilian agtech firms receive less support from URCs (as shown in Figure 10) and have limited access to venture capital (as illustrated in Figures 11 and 12). Additionally, the challenging economic environment and regulatory framework in Brazil may have also hindered the growth of these firms. These factors may have contributed to the longer development period for Brazilian agtech firms, as they may faced more significant challenges in the early stages of their business.

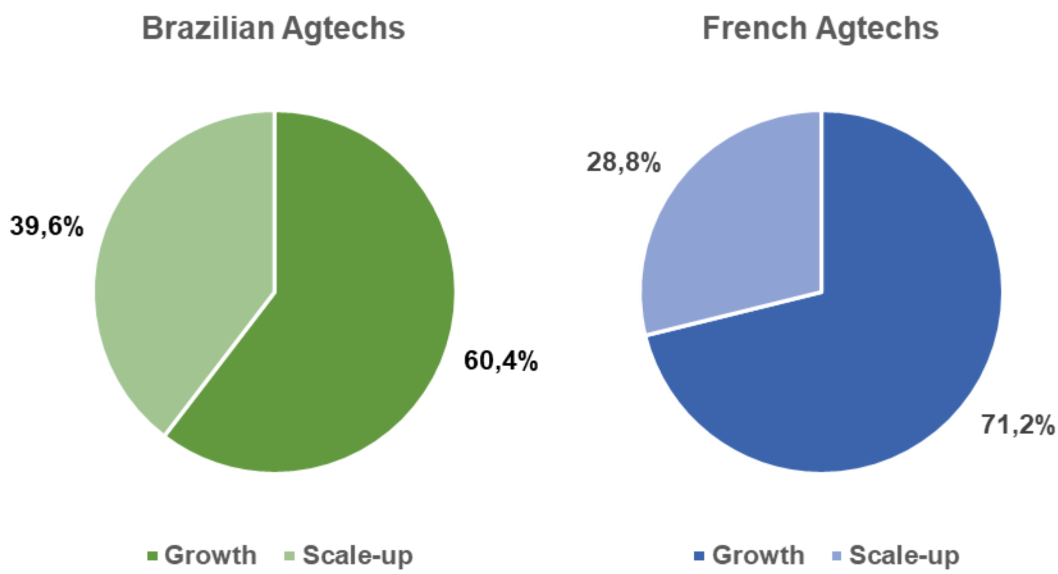
Furthermore, our sample of successful agtech firms revealed that a higher proportion of French agtech firms (71.2%) were in the scale-up phase compared to the Brazilian sample (60.4%). This finding suggests that French agtech firms may be more likely to achieve higher levels of business development at a faster pace than their Brazilian counterparts (see Figure 9).

Figure 8 – Year of foundation



Source: elaborated from the research data.

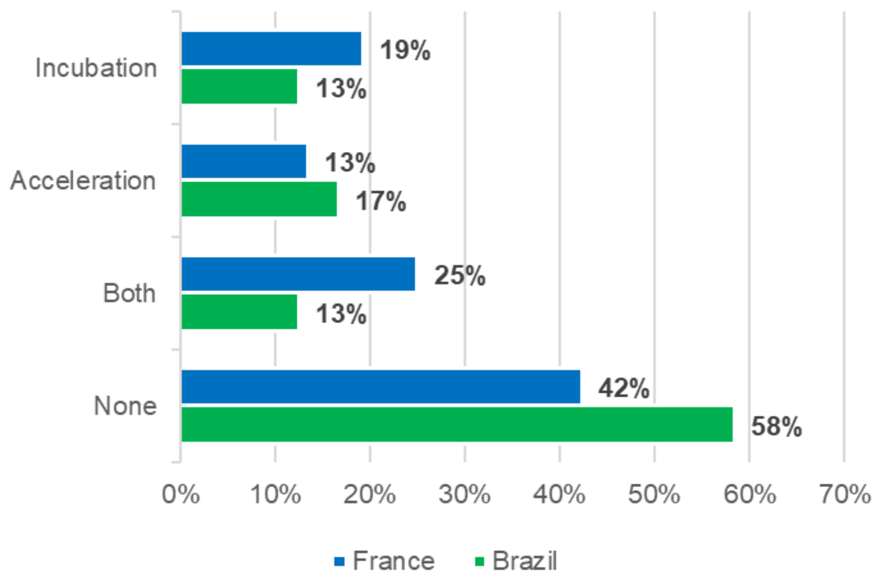
Figure 9 – Business phase



Source: elaborated from the research data.

Our analysis of the surveyed agtech firms in Brazil and France also uncovered some notable differences regarding in their involvement in development programs for NTBFs characteristics and financing sources. In Brazil, we found that the majority of growing agtechs (58%) did not participate in any incubation or acceleration programs provided by universities and research centers (URCs). This suggests that Brazilian agtechs are less reliant on URC support for their development compared to their French counterparts. On the other hand, in France, 58% of agtech firms participated in at least one incubation or acceleration program, with 19% participating in incubation, 13% in acceleration, and 25% in both (Figure 10).

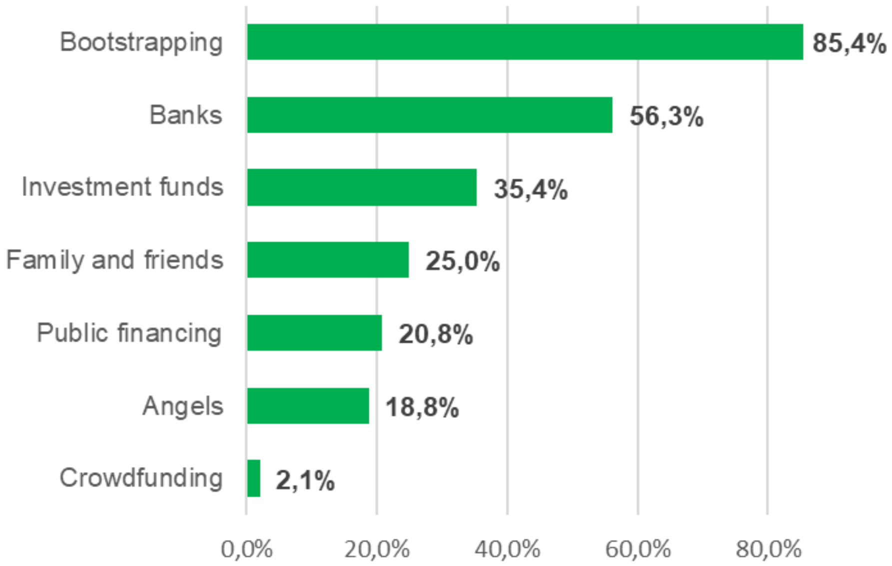
Figure 10 – Involvement in development programs for NTBFs



Source: elaborated from the research data.

In terms of investment sources, most Brazilian agtechs (85.4%) rely on their own resources to finance their activities, although not exclusively. This self-financing approach is recognized as bootstrapping, which is the primary financial source for Brazilian agtechs, as shown in Figure 11. The second most utilized financial source for Brazilian agtechs are traditional loans obtained from banks, with 56.3% of agtechs relying on this funding method. These findings highlight the difficulties that Brazilian agtechs face in accessing any type of venture capital. For instance, investment funds, which are in third place, with only 35.4% of the Brazilian agtechs in our sample receiving this type of investment.

Figure 11 – Funding sources used by Brazilian agtechs

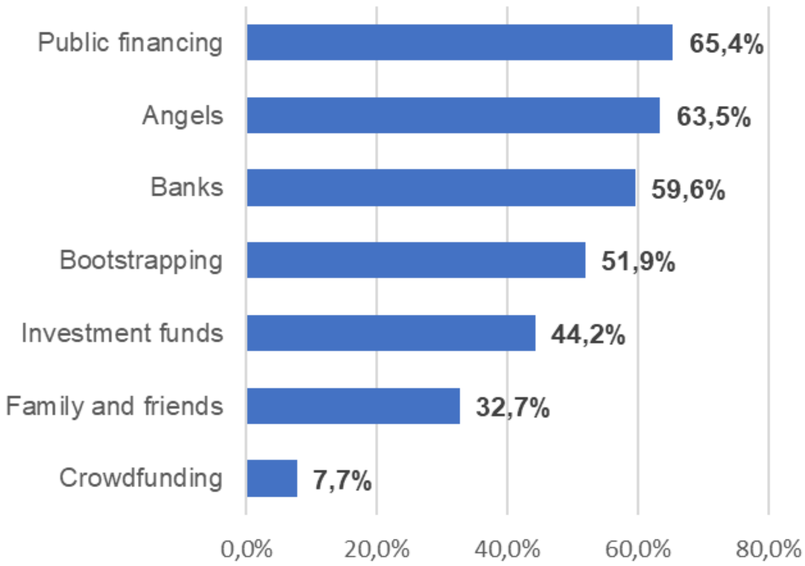


Source: elaborated from the research data.

In contrast to Brazilian agtechs, French agtechs appear to have greater access to government financial incentives and multiple sources of venture capital. Public funding, obtained through public notices and development agencies, is the primary source of financial resources for the surveyed French agtechs (Figure 12), with 65.4% of our sample utilizing this type of financing. Business angels are in second place, with 63.5% of French agtechs receiving support from this funding source. This higher availability of venture capital for French agtechs is not surprising given that in 2022, approximately 15 billion dollars were invested in venture capital in France, compared to 4.2 billion dollars invested in Brazil during the same period (DEALROOM.CO, 2023).

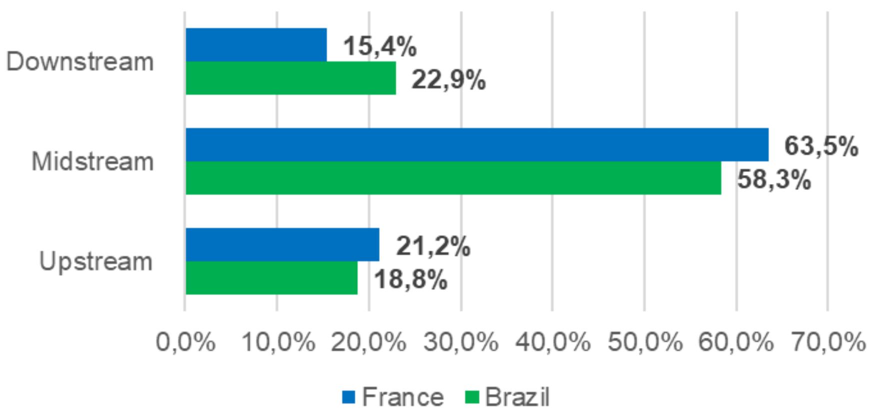
In terms of the position of agtech firms within the agribusiness supply chain, our analysis revealed that both the Brazilian and French samples are primarily focused on developing innovative technologies and solutions for midstream activities related to food production, with approximately 60% of agtech firms in both samples falling into this category (Figure 13). This includes areas such as meat, fish, animal feed, and dairy. The remaining agtech firms are divided between the upstream sector, which involves agriculture inputs such as seeds, fertilizers, machinery, and technology for agriculture, and the downstream sector, which is associated with the food processing industry (SCOTT, 2015). This similarity in the focus of agtech firms in both countries suggests that there are common challenges and opportunities faced by agtechs across different regions in the world.

Figure 12 – Funding sources used by French agtechs



Source: elaborated from the research data.

Figure 13 – Placement in the agribusiness supply chain

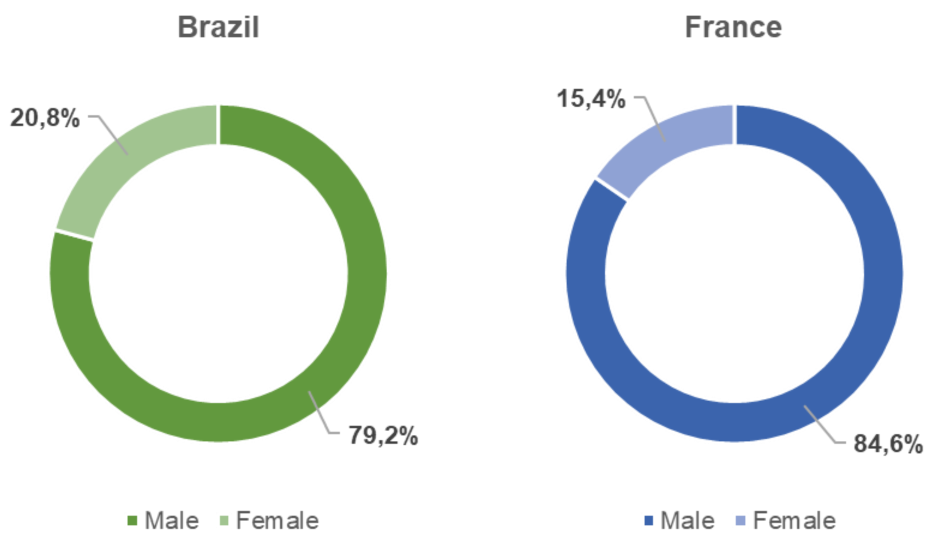


Source: elaborated from the research data.

When analyzing the entrepreneurs who participated in our survey, we identified some similarities between the Brazilian and French samples. One notable finding is that both samples were predominantly composed of male participants, with 79.2% of respondents in Brazil and 84.6% in France being men (Figure 14). Although this gender imbalance is not unique to the agtech industry, it is a widespread issue across various sectors of NTBFs. Recently, researchers have explored potential strategies to address this disparity (e.g., ENGEL et al., 2022).

In terms of age, we found that the majority of participants in both Brazil and France fell between the ages of 31 to 50. The average age of Brazilian respondents was 39.6 years, while in France, it was slightly lower at 38.1 years (see Table 23). Interestingly, our results indicate that France had a higher percentage of younger agtech entrepreneurs (23.1%) under the age of 30, compared to Brazil (8.3%). This finding aligns with recent research challenging the common belief that successful entrepreneurs must be young garage-startup founders. Studies have revealed that new technology-based firms (NTBFs) that have demonstrated the most significant growth are led by entrepreneurs with an average age of 45 years (AZOULAY et al., 2018).

Figure 14 – Respondent's gender



Source: elaborated from the research data.

Table 23 – Respondent's age

Entrepreneur's age	Brazil		France	
	N	**%**	**N**	**%**
Up to 30 years	4	8,3%	12	23,1%
31 to 40 years	23	47,9%	21	40,4%
41 to 50 years	20	41,7%	12	23,1%
51 to 60 years	1	2,1%	5	9,6%
More than 60 years	0	0,0%	2	3,8%
Mean	**39,6 years**		**38,1 years**	

Source: research data.

Furthermore, we found that the majority of respondents in both Brazil (60.4%) and France (59.6%) held the position of Chief Executive Officer (CEO) in their agtech firms. In addition, we received a significant number of responses from Chief Operating Officers (COOs) in Brazil (20.8%) and France (7.7%). The high response rate from the top leadership positions in agtech firms (see Table 24) ensured that the information gathered was more accurate and representative of the agtech ecosystem in both countries. In the following section, we describe how the data collected from the agtech firms was analyzed to address the research objectives.

Table 24 – Respondent's position

Respondent's position	Brazil	%	France	%
CEO (Chief Executive Officer)	29	60,4%	31	59,6%
CMO (Chief Marketing Officer)	2	4,2%	4	7,7%
COO (Chief Operating Officer)	10	20,8%	4	7,7%
CFO (Chief Financial Officer)	4	8,3%	0	0,0%
CTO (Chief Technology Officer)	1	2,1%	1	1,9%
CPO (Chief Product Officer)	1	2,1%	0	0,0%
BDM (Business Development Manager)	0	0,0%	3	5,8%
CSM (Customer Success Manager)	0	0,0%	1	1,9%
CSO (Chief Scientific Officer)	0	0,0%	2	3,8%
Other	1	2,1%	6	11,5%

Source: research data.

3.4.4 Exploring KTCs for agtechs: an analysis using Mann–Whitney U

To investigate whether agtechs that rely heavily on knowledge transfer from URCs have better-developed capabilities, we used Mann–Whitney U tests to compare the cases of Brazilian and French agtechs separately. The Mann-Whitney U test is recognized as the most potent nonparametric alternative to the t-test to compare independent samples and determine if there is a significant difference in the mean values between them or if the differences are due to chance (HILL; LEWICKI, 2005; MUELLER; VOLERY; VON SIEMENS, 2012). The Mann–Whitney U test provides an effect size ("U") value that compares the variation between the groups to the variation within the groups, indicating whether the differences between the means of the groups are significant or not. In practical terms, if the significance of the U effect size is equal to or less than 5%, it can be concluded that the difference between the means of the groups is significant.

We used the Mann–Whitney U test to compare the ordinary capabilities of agtech firms that heavily rely on knowledge transfer from URCs to those that do not rely heavily on URCs. Specifically, we compared the means of the two groups of agtech firms from Brazil and France separately to determine if there were any significant differences in their capabilities.

To conduct our analysis, we determined the two groups based on their use of each knowledge transfer channel. We used the median value of each channel to define the two groups. Agtechs that heavily rely on knowledge transfer from URCs were classified as the "high" group if their usage was above the median transfer channel value, while agtechs that were less dependent on this transfer channel were classified as the "low" group if their usage was below the median value. This allowed us to compare the differences in ordinary capabilities between the two groups for each knowledge transfer channel.

Therefore, to address the first specific objective of this research – *to evaluate the effectiveness of knowledge transfer channels from universities and research centers (URCs) in supporting the development of ordinary capabilities in NTBFs* – we replicated this procedure for all knowledge transfer channels to determine which capabilities each channel is best suited to develop. By comparing means through Mann–Whitney U test, we were able to detect significant differences in the development of various capabilities between agtechs that use different knowledge transfer channels.

Furthermore, in our analysis, we utilized Spearman's correlation to probe potential associations between the utilization of KTCs and the level of capability development. We chose the Spearman method over Pearson due to its appropriateness for non-parametric data, aligning with the nature of our collected data (MYERS; SIROIS, 2014).

These correlation assessments offered additional insights into whether any form of association, whether positive or negative, existed between the variables we examined, namely KTCs and capabilities. It's important to underscore that these tests cannot establish causal relationships. Additionally, it's worth noting that Spearman correlations do not take into account the magnitude of differences among respondents. Consequently, it's possible for respondents to show little or no agreement on specific elements while still producing a relatively high correlation result (DECUIR-GUNBY; MARSHALL; MCCULLOCH, 2011).

Therefore, Spearman's correlation can serve as a valuable complementary tool alongside Mann–Whitney U test to gain a more comprehensive understanding of the relationships between the phenomena under investigation. While Mann–Whitney U test help identify statistically significant disparities in means between groups, Spearman's correlation delves deeper by revealing the strength and direction of associations between variables. This combined approach enabled us to not only identify differences but also explore the degree and nature of relationships, contributing to a more comprehensive and insightful analysis of the researched phenomena. In the following section, we detail how we applied fsQCA to address the specific objectives B and C.

3.4.5 Configuring agtech capabilities: an analysis using fsQCA

As previously discussed, much of the research on the Resource-Based View (RBV) theory has traditionally focused on explaining the impact of individual resources on the performance of New Technology-Based Firms (NTBFs). However, this is a complex phenomenon that cannot be fully understood by examining symmetric and linear relationships between factors. While the RBV has effectively emphasized the significance of strategic resources in enhancing organizational performance (e.g., BARNEY, 1991, 1995), it has fallen short in addressing how managers utilize and configure these resources to create value (SIRMON; HITT; IRELAND, 2007; SYMEONIDOU; NICOLAOU, 2018).

This shortcoming has resulted in a narrow perspective within the resource-based tradition, assuming that a greater quantity and/or quality of resources inherently lead to higher levels of firm performance (CLARYSSE; BRUNEEL; WRIGHT, 2011). However, numerous scholars have raised doubts about this simplistic relationship (CLARYSSE; BRUNEEL; WRIGHT, 2011; DOBBS; HAMILTON, 2007; GARCÍA-CABRERA; GARCÍA-SOTO; OLIVARES-MESA, 2019; MORENO; CASILLAS, 2007; OLIVA et al., 2019). They argue that it is not only the stock of organizational resources that matters but also the ability to transform these resources into a competitive advantage, ultimately resulting in higher levels of performance (CLARYSSE; BRUNEEL; WRIGHT, 2011; DOBBS; HAMILTON, 2007).

Following this logic, we assume that different capabilities can be bundled together to form various capability configurations, shaping unique business strategies that ultimately explain variations in firm performance (CLARYSSE; BRUNEEL; WRIGHT, 2011; GRUBER et al., 2010; SIRMON; HITT; IRELAND, 2007). Therefore, just as different destinations can be reached through various routes, outcomes can be achieved through different means, explained by diverse combinations of antecedent conditions (PAPPAS; WOODSIDE, 2021).

Hence, a configurational approach should be particularly effective in overcoming the common limitations of RBV studies. According to this approach, superior performance is related to the proper configuration of a firm's relevant resources (DOTY; GLICK; HUBER, 1993). This reasoning aligns with the principle of equifinality (NDOFOR; PRIEM, 2011; RIHOUX; RAGIN, 2009), which suggests that multiple equally effective organizational forms can lead to the same level of effectiveness.

Therefore, our research relies on the inherent versatility of ordinary capabilities, demonstrating their diverse applications and synergistic configuration possibilities (NASON; WIKLUND, 2018; PIASKOWSKA; TIPPMANN; MONAGHAN, 2021). This versatility of ordinary capabilities enables firms to reallocate resources productively and tap into promising opportunities, thereby driving firm performance (DESANTOLA; GULATI, 2017; PENROSE, 1959; PIASKOWSKA; TIPPMANN; MONAGHAN, 2021).

Following this reasoning, the performance of NTBFs is determined by their ability to align their capabilities with their strategic objectives, thus creating competitive advantages and achieving desired outcomes (GARCÍA-CABRERA; GARCÍA-SOTO; OLIVARES-MESA, 2019). The extent to which they can effectively configure the resources at their disposal is the key determinant of their overall performance (DOBBS; HAMILTON, 2007; HAMANN et al., 2013).

To investigate how growing agtechs configure their ordinary capabilities to enhance firm performance, we utilized a Fuzzy Set Qualitative Comparative Analysis (fsQCA). This method employs logical techniques such as Boolean algebra, fuzzy set theory, and logic minimization to analyze data. It has been widely used in business research as it provides valuable insights into complex relationships between variables (e.g., BRENES; CIRAVEGNA; ACUÑA, 2020; COVIN et al., 2020; GABAY-MARIANI; PAILLÉ; VALÉAU, 2023; MARCONATTO et al., 2022a; TEIXEIRA et al., 2021b).

The fsQCA method is particularly suitable for this study as it examines sets of relationships, offering equally effective configurations to enhance firm performance, rather than analyzing symmetric and linear associations between variables (MALLON; LANIVICH; KLINGER, 2018; RAGIN, 2008; SCHNEIDER; WAGEMANN, 2012; WAGEMANN; BUCHE; SIEWERT, 2016). Relationships among variables are naturally complex, sometimes non-linear, and sudden changes can lead to different results and outcomes (URRY, 2005), making fsQCA suitable for our research context.

Compared to linear approaches, fsQCA focuses on the complex and asymmetric relations between the outcome of interest and its antecedents, while variance-based methods compute the net effect between variables in a model. As a result, a typical variance-based analysis would identify a single best solution, thus limiting the capacity to fully understand the phenomenon under analysis. Therefore, fsQCA offers a step towards a holistic and simultaneous understanding of the patterns these conditions create, by employing a configuration theory approach (PAPPAS; WOODSIDE, 2021).

FsQCA combines the logical and empirical depth of qualitative approaches, rich in contextual information, with quantitative methods capable of handling large numbers of cases and being more generalizable than symmetric theories and tools (RAGIN, 2014). Qualitative inductive reasoning involves analyzing data "by case" rather than "by variable" and is combined with quantitative empirical testing, as sufficient and necessary conditions identify outcomes through statistical methods (PAPPAS; WOODSIDE, 2021).

Therefore, utilizing the fsQCA methodological approach enables us to address many calls for investigations that not only focus on the effect size of the relationships between resources and firm performance but also on how these resources are configured in each specific context to enhance firm effectiveness (BARBERO; CASILLAS; FELDMAN, 2011; CLARYSSE; BRUNEEL; WRIGHT, 2011; GARCÍA-CABRERA; GARCÍA-SOTO; OLIVARES-MESA, 2019; PIASKOWSKA; TIPPMANN; MONAGHAN, 2021).

In this context, the equifinal view of causality in fsQCA becomes an important component for understanding how resources are configured to foster firm performance. Equifinality stands in sharp contrast to the unifinal perspective of many statistical techniques, including the commonly used additive and linear regression models. In a regression equation, only one way exists to produce the outcome, as described in the additive regression equation. In contrast, a solution for sufficient conditions in fsQCA reveals different paths considered as alternatives for an outcome. Therefore, the perception of causal inference, typical in these linear methods, requires the researcher to assume that causal effects are unifinal and additive, not equifinal and conjunctural (SCHNEIDER; WAGEMANN, 2010).

Moreover, in variance-based studies, causal complexity often leads to significant technical problems, such as integrating interaction effects and the related loss of degrees of freedom, or the phenomenon of multicollinearity. In fsQCA studies, causal complexity often results in idiosyncratic explanations for every single case, at the expense of generalizability beyond the case(s) under examination (SCHNEIDER; WAGEMANN, 2010).

In summary, the fsQCA method possesses three fundamental characteristics that render it particularly well-suited for this research (RAGIN, 2008; WAGEMANN; BUCHE; SIEWERT, 2016):

1. Configural Causation: One of the key strengths of fsQCA lies in its recognition of configural causation. This perspective acknowledges that causes seldom operate in isolation; instead, they often interact and combine to influence outcomes. In other words, it considers the holistic interplay of multiple factors.
2. Equifinal Causal Statements: Unlike some other methods, fsQCA embraces the concept of equifinal causal statements. This means that there can be several valid explanations for a given outcome, all of which

are considered equally plausible. Consequently, it allows for the identification of different pathways leading to the same result.

3. Asymmetry Analysis: A distinguishing feature of fsQCA is its approach to asymmetry analysis. It recognizes that explaining the absence of an outcome (i.e., the negation of the phenomenon under investigation) typically cannot be directly inferred from the explanation of the presence of that outcome. This stands in contrast to quantitative methods where the explanation for the dependent variable remains the same regardless of whether it takes on low, high, or zero values. In essence, fsQCA stands apart from other research methods by facilitating an examination of causal diversity characterized by equifinal, configural, and asymmetric causal relationships.

To operationalize our fsQCA analysis, we followed the four-step procedure outlined by Rihoux and De Meur (2009). The first step involved defining the cases to be analyzed. We used data collected from the 48 Brazilian agtechs and 52 French agtechs surveyed, treating them as separate samples. As such, we conducted two distinct sets of analyses for each country, enabling us to identify configurations that were better suited to each context.

In the second step, we defined the causal conditions and the outcome for the fsQCA analysis. A causal condition in QCA analysis is a condition that is believed to be causally related to the outcome, or in other words, it is a relevant aspect of a case that helps explain the outcome (RAGIN, 2008). In this study, the causal conditions refer to the eight ordinary capabilities specified in the research framework: (a) networking capabilities, (b) marketing capabilities, (c) technological capabilities, (d) innovation capabilities, (e) execution capabilities, (f) financial capabilities, (g) human resource management (HRM) capabilities, and (h) organizational capabilities.

To use these factors as causal conditions in our research, we operationalized the measures by calculating the mean of the individual items that comprised each factor. For example, to evaluate the technological capability of each agtech, we took the average of the five items that made up this construct. We applied this same process to the other causal conditions and the outcome.

The outcome condition in QCA analysis is the variable that represents the phenomenon or outcome being studied, which is the primary focus of the analysis. It is the phenomenon that the researcher seeks to explain by identifying the necessary and/or sufficient conditions that lead to its occurrence (RAGIN, 2014). Sometimes the outcome condition is figuratively associated with the dependent variable in quantitative studies. In our research, the outcome condition is the agtech performance, which is measured by the average of the five performance variables identified in our study. These variables are related to the performance in revenue growth, net profit, valuation, product innovation, and employment growth.

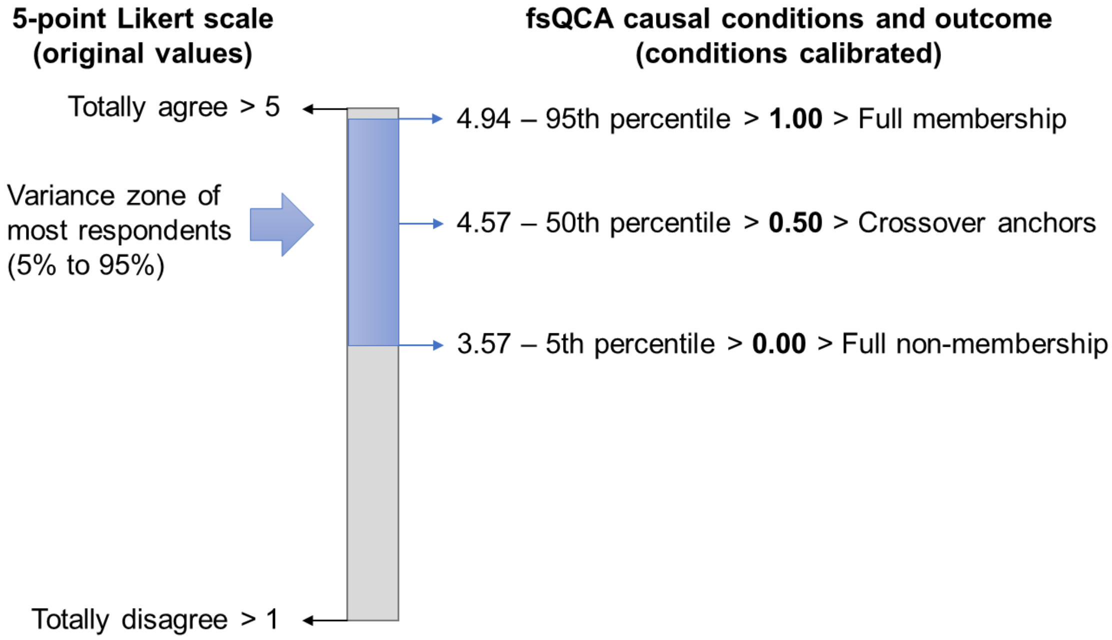
However, it is worth noting that given our measurements for both causal conditions and the outcome relied on a 5-point Likert scale, where "1" signified "totally disagree" and "5" indicated "totally agree," a crucial step was to calibrate the original variables. Calibration is a pivotal process in QCA studies, involving the assignment of (fuzzy) set membership values to individual cases. This crucial procedure is closely intertwined with the development of concepts and, therefore, must adhere rigorously to established standards of validity, reliability, and replicability (WAGEMANN; BUCHE; SIEWERT, 2016).

During the calibration process, the raw data is transformed into fuzzy sets, characterized by three substantively meaningful thresholds ranging from 0 to 1: full membership (fuzzy score = 0.95), crossover anchors (fuzzy score = 0.50), and full non-membership (fuzzy score = 0.05) (COVIN et al., 2020; FISS, 2011; RAGIN, 2017). The "crossover" point represents the “maximum ambiguity (i.e., fuzziness) in the assessment of whether a case is more in or out of a set” (RAGIN, 2008, p. 30).

Within the realm of fuzzy set calibration, data calibration can assume either a direct or indirect form. In our study, we employed "continuous" calibration, rooted in the direct calibration option offered by the fsQCA software (WAGEMANN; BUCHE; SIEWERT, 2016). The direct method is widely recommended and more prevalent, as it allows researchers to explicitly set three values corresponding to full membership, crossover anchors, and full non-membership. This approach promotes more robust research, facilitating replication and validation, as it transparently elucidates the rationale behind threshold selection (PAPPAS; WOODSIDE, 2021).

To calibrate the causal conditions and the outcome, we adopted a similar procedure to earlier studies based on percentile values (e.g., GABAY-MARIANI; PAILLÉ; VALÉAU, 2023; MARCONATTO et al., 2022a; XIE; WANG, 2020). The 5th percentile was used to estimate full non-membership, the 50th percentile for estimating crossover anchors, and the 95th percentile for estimating full membership. For example, when calibrating the marketing capabilities variable, the 5th percentile value of 3.57 was set as the minimum value for full non-membership, the 50th percentile value of 4.57 was set as the intermediate value for crossover anchors, and the 95th percentile value of 4.94 was set as the maximum value for full membership. Figure 15 provides a visual example of this procedure.

Figure 15 - Visual example of the calibration process for marketing capabilities



Source: elaborated from the research data.

We have adopted the calibration strategy relying on the 5th, 50th, and 95th percentiles for three fundamental reasons. Firstly, these percentiles offer a more extensive range, resulting in increased variability and finer granularity during variable calibration. To illustrate this, let's consider a hypothetical scenario where we employ quartile criteria (25th, 50th, and 75th) for calibration. In this case, all values below the 25th percentile would be categorized as non-membership, effectively approximating "0" in the newly calibrated fuzzy set. This would lead to a significant loss of valuable information.

Secondly, our choice of calibrating based on the 5th, 50th, and 95th percentiles aligns seamlessly with the programming specifications outlined by Ragin (2017, p. 15) in the fsQCA software, ensuring consistency and compatibility. Thirdly, it's worth noting that this approach enjoys widespread acceptance as a best practice in management studies published in high-impact journals. For instance, recent works by Gabay-Mariani et al. (2023), Marconatto et al. (2022a), and Xie and Wang (2020) have all employed and endorsed this method, further underlining its validity and relevance.

To establish causal conditions and outcomes, the calibration procedure was replicated for all variables in both the Brazil and France samples. Descriptive statistics and estimated percentiles for the calibration process are presented in Table 25.

Based on this data, we conducted the final two phases of the QCA analysis: the necessity and sufficiency analysis (SCHNEIDER; WAGEMANN, 2012). These analytical steps yield two types of typologies: “monothetic” typologies, in which each feature is necessary for membership, and "polythetic" typologies, which can be formed from different combinations of causal conditions that, when considered jointly, are sufficient for the occurrence of the expected outcome (FISS, 2011).

Necessary conditions are those conditions that have to be present in order for an outcome to occur. The identification of a necessary condition implies that the outcome cannot occur without it (RAGIN, 2008; WAGEMANN; BUCHE; SIEWERT, 2016). In the context of our research, this analysis provided us with valuable insights into whether any of the individual ordinary capabilities possessed the inherent capacity to independently drive agtech performance.

Conversely, sufficient conditions refer to specific combinations of causal conditions that, when considered together, are sufficient to produce a specific outcome or result. In essence, when these conditions coexist, they collectively lead to the desired outcome. The identification of sufficient conditions in fsQCA enables researchers to uncover different pathways, consisting of various combinations of causal conditions, that can equally lead to the outcome. This insight is valuable for gaining a deeper understanding of complex causality. In our research, the sufficiency analysis aimed to identify one or multiple configurations of causal conditions (i.e., ordinary capabilities) that were related to the outcome (i.e., agtech performance).

In summary, the fsQCA method enabled us to identify distinct configurations that constitute sufficient and/or necessary conditions for the outcome of interest (PAPPAS; WOODSIDE, 2021). Analyzing both necessary and sufficient conditions offers complementary insights for understanding complex causality. For instance, findings from the analysis of necessary conditions can prove beneficial in the analysis of sufficiency and in addressing logical remainders. If a necessary condition is identified, it allows us to automatically exclude rows from the truth table (no matter if existing ones or logical remainders) that do not satisfy this condition from the minimization process (WAGEMANN; BUCHE; SIEWERT, 2016).

Table 25 – Calibration of causal conditions and outcomes

Sample	Causal Conditions / Outcome	Mean	Std. Dev.	Min.	Max.	Percentiles		
						5	50	95
Brazil	Technological Cap. (TEC)	4.48	0.35	3.60	5.00	3.80	4.60	5.00
	Marketing Cap. (MKT)	4.45	0.40	3.29	5.00	3.57	4.57	4.94
	Innovation Cap. (INN)	4.22	0.38	3.60	5.00	3.60	4.20	4.91
	Networking Cap. (NET)	4.47	0.42	3.00	5.00	3.69	4.40	5.00
	HRM Cap. (HRM)	4.30	0.44	3.33	5.00	3.41	4.33	4.93
	Organizational Cap. (ORG)	4.45	0.47	3.17	5.00	3.32	4.50	5.00
	Financial Cap. (FIN)	4.36	0.48	2.60	5.00	3.18	4.40	5.00
	Execution Cap. (EXC)	4.30	0.37	3.00	5.00	3.50	4.25	4.89
	Agtech Performance (PER)	4.46	0.51	2.60	5.00	3.49	4.60	5.00
France	Technological Cap. (TEC)	4.29	0.58	2.80	5.00	2.93	4.40	5.00
	Marketing Cap. (MKT)	3.74	0.60	2.43	5.00	2.61	3.71	4.76
	Innovation Cap. (INN)	3.93	0.67	2.20	5.00	2.40	3.80	5.00
	Networking Cap. (NET)	4.09	0.55	2.60	5.00	3.13	4.10	5.00
	HRM Cap. (HRM)	3.84	0.60	2.33	5.00	2.61	3.83	4.89
	Organizational Cap. (ORG)	3.61	0.59	2.50	5.00	2.72	3.58	4.73
	Financial Cap. (FIN)	4.00	0.61	2.80	5.00	2.93	4.00	5.00
	Execution Cap. (EXC)	3.68	0.69	2.00	5.00	2.66	3.75	5.00
	Agtech Performance (PER)	4.33	0.77	1.60	5.00	2.60	4.60	5.00

Source: research data.

To proceed with the sufficiency analyses, the subsequent step involves executing the fuzzy-set algorithm and generating the truth table (PAPPAS; WOODSIDE, 2021). The truth table is a data matrix that catalogs all conceivable configurations of sets and their corresponding outcomes (BRAUMOELLER, 2015).

Within the truth table, individual columns represent distinct conditions, which may include both causal conditions and the outcome itself. Conversely, each row signifies one of the logically conceivable combinations among these conditions. Since each condition can exist in either a state of presence or absence, the total number of truth table rows is calculated using the formula 2^k. Here, 'k' denotes the number of conditions employed, and '2' signifies the two possible states (presence or absence) for each condition. The formula 2^k yields the total number of truth table rows, corresponding to the logically possible combinations (SCHNEIDER; WAGEMANN, 2012).

While determining all feasible configurations, the frequency of each configuration is also estimated, denoting the number of occurrences for every possible combination. It is important to note that certain configurations will exhibit a frequency of zero, indicating that none of the cases within the sample can be accounted for by those specific combinations. As the number of causal conditions included in the analysis expands, the number of potential configurations escalates exponentially (2^k). Consequently, when more causal conditions are introduced, it becomes increasingly likely that numerous combinations will have a frequency of zero (PAPPAS; WOODSIDE, 2021).

As explained by Schneider and Wagemann (2012), in the examination of the truth table the outcome column serves as a key indicator, determining whether a specific truth table row, representing a combination of causal conditions, is sufficient to explain the outcome of interest. When a particular combination of causal conditions is found to be sufficient, it is denoted by a value of 1 in the outcome column. Consequently, the initial step in the analysis of the truth table involves creating a Boolean expression for all those truth table rows linked to the outcome under analysis. This process leads to the creation of conjunctions, also referred to as primitive expressions. Each of these primitive expressions is conceptualized as an individual sufficient condition for the outcome in the process of creating the truth table.

However, this outcome-based approach often yields an extensive list of primitive expressions, which can be challenging to interpret and manage due to its volume. Consequently, the subsequent task consists in reformulating the same logical truth in a more streamlined and concise manner, with the aim of achieving a more succinct and parsimonious outcome. This process is called logical minimization.

To undertake logical minimization, the Quine-McCluskey algorithm is a commonly employed tool, systematically condensing the various sufficiency statements present in a truth table (see, GABAY-MARIANI; PAILLÉ; VALÉAU, 2023; LEISCHNIG; HENNEBERG; THORNTON, 2016; SCHNEIDER; WAGEMANN, 2012). This procedure aligns with a fundamental principle of logical minimization: when two truth table rows, both linked to the outcome, differ in only one condition – with that condition present in one row and absent in the other – this condition can be deemed logically redundant and irrelevant for producing the outcome in the presence of the remaining conditions shared between these rows. Consequently, the logically redundant condition can be omitted, and the two rows can be merged into a simpler conjunction of conditions that retains sufficiency for explaining the outcome more efficiently (SCHNEIDER; WAGEMANN, 2012).

Furthermore, it is necessary to refine the truth table based on frequency and consistency. Frequency here denotes how many cases within the sample can be accounted for by a particular configuration. To ensure that a minimal number of cases is available for evaluating the relationships, a frequency threshold is established. For samples larger than 150 cases, the frequency threshold may be set at 3 or higher. Conversely, for smaller samples, the threshold may be set at 2 (FISS, 2011; PAPPAS; WOODSIDE, 2021) or even 1 (KAYA et al., 2020; MARCONATTO et al., 2022a).

Considering that our study relies on two relatively small samples – 48 cases from Brazil and 52 from France – and that these samples are analyzed individually, we've set the threshold at 1. This means that any configuration with at least one case is considered valid. Consequently, this lower frequency threshold could enhance the sample's coverage because it allows us to consider a greater number of configurations that represent the analyzed phenomenon, albeit each combination refers to fewer cases in the sample (PAPPAS; WOODSIDE, 2021).

After removing configurations with low frequencies, the next step involves refining the truth table based on raw consistency. In this step, it is necessary to establish a consistency threshold, with the recommended minimum value being 0.75 (PAPPAS; WOODSIDE, 2021; RIHOUX; RAGIN, 2009). In our research, in line with prior studies (e.g., BEYNON; JONES; PICKERNELL, 2020; COVIN et al., 2020; GABAY-MARIANI; PAILLÉ; VALÉAU, 2023), we adopted a consistency cutoff of 0.90 for our sufficiency analyses. This decision serves to enhance the reliability of our results, as it dictates that for a configuration to be deemed sufficient, it must be linked to the outcome in at least 90% of cases.

Moreover, to strengthen the robustness of the results, in the sufficiency analysis we excluded the truth table rows in which the proportional reduction in inconsistency (PRI) score was less than 0.50 (GRECKHAMER et al., 2018). The PRI score was used to preserve the uniqueness of solutions by preventing the same configuration from simultaneously leading to an outcome and its negation (CRESPO et al., 2019). Based on these criteria, we performed the standard fsQCA analysis.

During the process of conducting a standard analysis, fsQCA generates three distinct solutions (RAGIN, 2017; SCHNEIDER; WAGEMANN, 2012): the complex solution, the parsimonious solution, and the intermediate solution. These three solutions exhibit notable differences in their treatment of logical remainders, which refer to configurations that are theoretically plausible but not observed in empirical cases (PAPPAS; WOODSIDE, 2021; RAGIN, 2008).

In the complex solution, logical remainders are entirely disregarded. This implies that any theoretically possible configurations not observed in empirical data are excluded from the analysis. In contrast, the parsimonious solution takes a more inclusive approach, considering all logical remainders. It systematically evaluates every theoretically possible configuration, irrespective of empirical representation, ensuring a comprehensive examination of all potential scenarios (GABAY-MARIANI; PAILLÉ; VALÉAU, 2023).

The primary distinction between the parsimonious and complex solutions lies in their treatment of counterfactual cases, with limited simplification in the complex solution and the incorporation of any counterfactual combination contributing to a logically simpler solution in the parsimonious approach (PAPPAS; WOODSIDE, 2021). Schneider and Wagemann (2012) refer to the complex solution as the "conservative solution" because it relies exclusively on empirical information, refraining from making assumptions about logical remainders.

The intermediate solution is derived from a process of counterfactual analysis applied to both the complex and parsimonious solutions, considering only theoretically plausible counterfactual scenarios (PAPPAS; WOODSIDE, 2021). This approach selectively retains remainders that withstand scrutiny based on theoretical and substantive knowledge (RAGIN, 2008; RAZMDOOST; ALINAGHIAN; LINDER, 2020). In summary, the conditions in the parsimonious solution are referred to as "core conditions" as they endure both "easy" and "difficult" counterfactual, while the intermediate solution is streamlined based on the researcher's assumptions or expectations regarding what would happen if the remainders were populated with cases (easy counterfactuals). Hence, it is thus called “intermediate solution” because it stands between the parsimonious (both easy and hard counterfactuals) and complex (no counterfactuals) solutions (MISANGYI; ACHARYA, 2014).

Following Ragin's (2008) recommendation, we prioritize the intermediate solution as the main reference point for interpreting our QCA results. Nevertheless, it's important to note that in our standard analysis, we refrained from making any theoretical assumptions for two main reasons. First, our analyses were primarily exploratory in nature, and the existing theoretical framework did not provide a clear indication that the presence or absence of each ordinary capability should necessarily lead to NTBF performance. Second, during the necessity analysis, no causal conditions emerged as being necessary. Consequently, this resulted in identical outputs for both the complex and intermediate solutions.

In the analysis of the solutions derived from the standard analysis, we employed other criteria beyond the frequency and consistency cutoffs, including solution coverage. The intermediate solutions yielded multiple configurations (e.g., Configuration A, B, C, and so forth), and raw coverage indicates the proportion of memberships in the outcome (in this case, agtech performance) explained by each specific combination of causal conditions (in this case, ordinary capabilities). Raw coverage encompasses any overlap among cases, as cases may exhibit multiple configurations. Conversely, unique coverage quantifies the portion of outcome membership solely attributable to a particular configuration (RAGIN, 2006).

In essence, raw coverage serves as a measure of empirical relevance, while unique coverage sheds light on the relative importance of each individual configuration (FISS, 2011; MISANGYI; ACHARYA, 2014). In our research, we established a minimum threshold of 0.10 for raw coverage, in line with the work of Gabay-Mariani et al. (2023). Remarkably, all generated configurations exceeded this established threshold.

Moving forward, within the fsQCA analysis, we executed a logical minimization of the configurations identified within the solutions derived from the standard analysis. This crucial step aimed to identify commonalities across different configurations belonging to the same solution, thereby consolidating terms and eliminating redundancy. In conducting this minimization process, we adhered to the guidelines set forth by Schneider and Wagemann (2012, p. 107), which elucidate several methods for summarizing sufficiency analysis information.

These guidelines emphasize that the different solution formulas and the intermediate steps of the minimization process: (a) are logically equivalent; (b) express the same information contained in the truth table; (c) do not contradict each other, nor do they contradict the information contained in the truth table; and (d) are acceptable summaries of the empirical information at hand. Furthermore, Schneider and Wagemann (2012, p. 107) assert that:

> “The principle that more than one solution term is an acceptable and logically correct representation of the data in the truth table is a general feature of QCA. The decision on which solution formula to choose as the basis for the substantive interpretation of the available information depends on many research-specific issues that have nothing to do with formal logic […]”.

This minimization process resulted in intermediary equations that succinctly encapsulate the strategic growth patterns adopted by agtech firms in Brazil and France. Instead of presenting a single equation encompassing all our findings, we opted to present intermediate equations that readily identify and define these distinct strategic patterns. We believe this decision enhances the reader's understanding of our research findings.

As a result of this procedure, we identified three primary groups within the French sample: "resourceful," "top performer," and "high-tech." In the Brazilian sample, we identified "resourceful," "outsourcer," and "homemade." In the following section, we delve into a detailed exploration of these research findings.

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4 RESEARCH RESULTS

This section presents the technical results of the Mann–Whitney U test and fsQCA analyses. To enhance clarity and facilitate understanding of the results in relation to the proposed objectives, we present them in the same sequence as the objectives introduced earlier.

Firstly, we present the results of the Mann–Whitney U test analyses carried out separately for the samples from Brazil and France. Our aim was to determine whether agtechs that heavily rely on knowledge transfer from universities and research centers (URCs) to acquire specialized knowledge have better-developed capabilities.

Next, we present the results of the fsQCA necessity analysis. This analysis enabled us to investigate whether the presence or absence of each of the eight ordinary capabilities alone is sufficient to achieve high levels of performance in agtechs.

Finally, we present the results of the fsQCA sufficiency analysis. This analysis helped us to identify different configurations of ordinary capabilities that can lead to equal levels of high performance in agtechs in Brazil and France.

It is important to note that the focus of this section is not to establish the relationship between our findings and existing literature. We will discuss this in Section 5, where we will also explore how these results address the gaps identified in the literature.

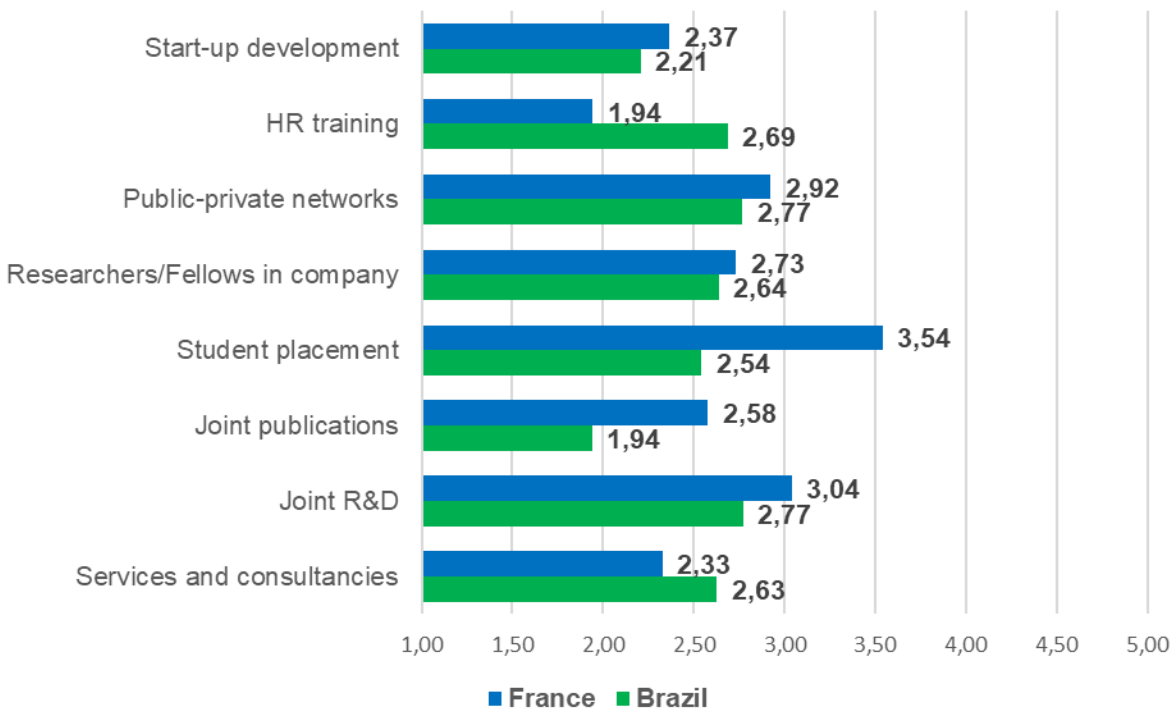
4.1 KNOWLEDGE TRANSFER AND CAPABILITY DEVELOPMENT

This section presents a comparative analysis using Mann–Whitney U test for the Brazilian and French samples, which were examined independently. Our objective was twofold: first, to investigate the degree to which agtech firms depend on each of the University-Research Center (URC) knowledge transfer channels for acquiring specialized knowledge; and second, to determine if there is a statistically significant difference in the development of ordinary capabilities between agtech companies that heavily rely on URC knowledge transfer and those that do not.

By employing this approach, we were able to assess whether the extent of reliance on URCs for specialized knowledge acquisition significantly influences the development of ordinary capabilities in agtech companies. Moreover, our findings allowed us to determine whether knowledge transfer channels from URCs are equally effective across different contexts or if their effectiveness is contingent upon the location of the firm.

As mentioned in the methodological section, to perform this analysis, we divided the sample of Brazilian agtechs into two subgroups based on their level of use for each mechanism for transferring specialized knowledge from URCs. The division was determined by the median of use, and the two groups were labeled as "high" and "low." For example, in the case of the first knowledge transfer channel analyzed, "Services and Consultancies" (KTC01), out of the 48 cases in the sample, 22 were classified as "low" use, and 26 were classified as "high" use. To maintain the readability of the text, we will not repeat this information in each analysis. However, we will provide it in the notes of each table to ensure transparency and clarity.

Figure 16 – Agtech reliance on URCs: Brazil and France comparison



Source: elaborated from the research data.

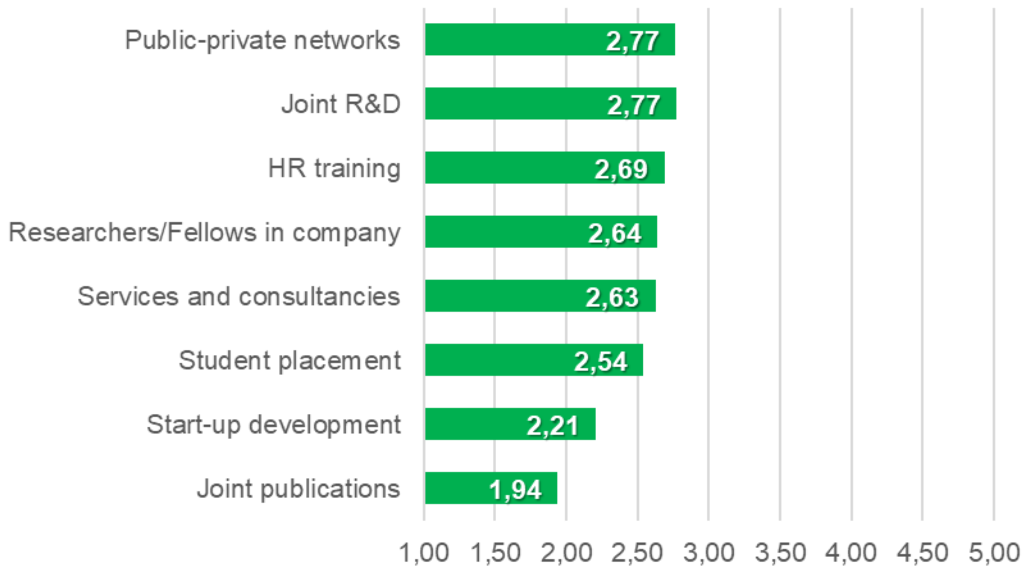
It is important to highlight that, contrary to initial expectations, agtechs in Brazil and France depend less on knowledge transfer from URCs. Figure 16 presents a comparison of the average usage of Brazilian and French agtechs for each of the

KTCs. Notably, the majority of means are below 3, which is considered the neutral point on a 5-point Likert scale. This evidence suggests that, on average, participants do not consider these channels to be a significant source for acquiring specialized knowledge for their business. However, two exceptions to this trend are the Student Placement (3.54) and Joint R&D (3.04) channels in the French sample, which recorded slightly higher averages than 3.

4.1.1 Brazilian agtechs and URC Knowledge Transfer Channels

As mentioned earlier, although agtechs in both countries have a relatively low reliance on URC knowledge, the dependence is even lower among Brazilian agtechs. The KTCs with the highest average usage among Brazilian agtechs are Public-Private Networks and Joint R&D, with an average usage of 2.77, below the neutral level of 3 on a 5-point Likert scale. In contrast, Joint Publications is the least utilized KTC, with an average usage of 1.94 among the sampled agtechs (see Figure 17). These findings suggest that while some KTCs are used more than others, overall, agtechs in Brazil have limited reliance on URC knowledge transfer channels.

Figure 17 – The reliance of Brazilian agtechs on Knowledge Transfer Channels



Source: elaborated from the research data.

Although there is low overall reliance on KTCs, our individual analysis of the use of these mechanisms by Brazilian agtechs shows that even with low average reliance, these knowledge transfer channels can be important for the development of specific capabilities. Therefore, the question of whether reliance on URC knowledge transfer channels supports the development of ordinary capabilities is complex and cannot be reduced to a simple answer such as ‘yes’ or ‘no’. Our results suggest that certain types of KTCs can support the development of specific capabilities in agtechs. Next, we present the individual analyses that support this idea, providing insights on which KTCs are most effective in supporting the development of ordinary capabilities in Brazilian agtechs.

Our analysis of Brazilian agtechs' reliance on Services and Consultancies (KTC01) shows that there are no significant differences in capability development between the low reliance group (M_{Low} = 1.36) and high reliance group (M_{High} = 3.69) on URC services and consultancies (Table 26). For instance, we found that the mean technological capability of the low reliance group was 4.49, while the high reliance group had 4.48. Similarly, the mean marketing capability of the low reliance group was 4.43, and the high reliance group had 4.47. These differences were not statistically significant (Sig. > 0.05).

Table 26 – Reliance on Services and Consultancies by Brazilian agtechs

Group Statistics				Mann–Whitney U test	
Variable	Group	Mean	Std. Dev.	U	Sig.
Services and consultancies (KTC01)	Low	1.36	0.492	0.000	0.000
	High	3.69	0.618		
Technological Capabilities	Low	4.49	0.273	268.500	0.713
	High	4.48	0.416		
Marketing Capabilities	Low	4.43	0.402	265.500	0.669
	High	4.47	0.399		
Innovation Capabilities	Low	4.15	0.375	233.000	0.266
	High	4.28	0.388		
Networking Capabilities	Low	4.40	0.494	254.000	0.502
	High	4.52	0.354		
HRM Capabilities	Low	4.27	0.456	262.500	0.623
	High	4.33	0.436		
Organizational Capabilities	Low	4.48	0.468	259.000	0.572
	High	4.42	0.484		
Financial Capabilities	Low	4.27	0.581	248.000	0.424
	High	4.43	0.378		
Execution Capabilities	Low	4.33	0.418	260.000	0.579
	High	4.27	0.339		

Source: research data.
Notes: $N_{LowGroup}$ = 22; $N_{HighGroup}$ = 26.

Regarding the utilization of the Joint R&D (KTC02) and Joint Publications (KTC03) channels, our analysis has yielded results consistent with those observed for KTC01. In broad terms, the groups exhibiting both low and high dependence on these channels have shown comparable levels of ordinary capability development, as illustrated in Tables 27 and 28. It is noteworthy that there were no statistically significant differences observed (Sig. > 0.05). Collectively, these findings indicate that relying on Joint R&D or Joint Publications for knowledge transfer does not necessarily yield discernible variations in the ordinary capabilities of Brazilian agtechs, whether higher or lower.

Table 27 – Reliance on Joint R&D by Brazilian agtechs

	Group Statistics			Mann–Whitney U test	
Variable	**Group**	**Mean**	**Std. Dev.**	**U**	**Sig.**
Joint R&D (KTC02)	Low	1.59	0.503	0.000	0.000
	High	3.77	0.815		
Technological cap.	Low	4.42	0.344	229.500	0.235
	High	4.53	0.362		
Marketing cap.	Low	4.53	0.220	269.500	0.730
	High	4.39	0.496		
Innovatiove cap.	Low	4.22	0.418	284.000	0.967
	High	4.22	0.359		
Networking cap.	Low	4.45	0.534	275.500	0.826
	High	4.48	0.311		
HRM cap.	Low	4.35	0.401	259.000	0.572
	High	4.26	0.476		
Organizational cap.	Low	4.51	0.441	251.500	0.470
	High	4.40	0.501		
Financial cap.	Low	4.48	0.330	229.000	0.231
	High	4.25	0.567		
Execution cap.	Low	4.32	0.301	284.000	0.966
	High	4.28	0.432		

Source: research data.
Notes: $N_{LowGroup} = 22$; $N_{HighGroup} = 26$.

Our examination of the Student Placement KTC (KTC04) has uncovered two noteworthy mean differences at the 10% significance level, although they do not meet the conventional significance threshold (Sig. < 0.05). Nonetheless, these findings provide valuable insights, as presented in Table 29. In particular, Brazilian agtechs that place a greater emphasis on Student Placement tend to exhibit lower levels of financial capabilities ($M_{Low} = 4.52$; $M_{High} = 4.26$; Sig. = 0.067) and concurrently, higher levels of innovation capabilities (M_{Low} = 4.12; M_{High} = 4.29; Sig. = 0.100), in comparison to their counterparts.

Table 28 – Reliance on Joint Publications by Brazilian agtechs

Variable	Group Statistics: Group	Mean	Std. Dev.	Mann–Whitney U test: U	Sig.
Joint publications (KTC03)	Low	1.00	0.000	0.000	0.000
	High	2.61	0.685		
Technological cap.	Low	4.46	0.372	258.500	0.648
	High	4.50	0.346		
Marketing cap.	Low	4.52	0.317	251.500	0.547
	High	4.40	0.443		
Innovatiove cap.	Low	4.18	0.383	250.000	0.524
	High	4.25	0.387		
Networking cap.	Low	4.36	0.526	227.500	0.266
	High	4.54	0.321		
HRM cap.	Low	4.28	0.379	253.500	0.575
	High	4.32	0.487		
Organizational cap.	Low	4.44	0.440	263.500	0.727
	High	4.45	0.503		
Financial cap.	Low	4.50	0.271	217.000	0.181
	High	4.26	0.573		
Execution cap.	Low	4.34	0.391	247.500	0.483
	High	4.27	0.366		

Source: research data.
Notes: $N_{LowGroup}$ = 20; $N_{HighGroup}$ = 28.

These results seem to suggest that while student placement plays a crucial role in team building and cultivating innovation capabilities in certain Brazilian agtechs, an excessive reliance on it may potentially hinder the development of financial capabilities. Consequently, it would be prudent for these firms to explore alternative strategies to foster growth and strengthen their capabilities, rather than relying solely on student placement.

A similar phenomenon was also observed in relation to the Researchers in Company channel (KTC05) and its impact on organizational capabilities (see Table 30). Although not statistically significant at the 5% level, our results suggest that Brazilian agtech companies that rely less on this channel to acquire specialized knowledge may have stronger organizational capabilities than those who heavily rely on it (M_{Low} = 4.58; M_{High} = 4.35; Sig. = 0.079). However, for other ordinary capabilities, we found no significant differences between the high and low reliance groups of Researchers in Company KTC.

Table 29 – Reliance on Student Placement by Brazilian agtechs

Variable	Group Statistics Group	Mean	Std. Dev.	Mann–Whitney U test U	Sig.
Student placement (KTC04)	Low	1.00	0.000	0.000	0.000
	High	3.55	1.325		
Technological cap.	Low	4.46	0.281	243.000	0.486
	High	4.50	0.399		
Marketing cap.	Low	4.54	0.302	241.500	0.469
	High	4.40	0.444		
Innovatiove cap.	Low	4.12	0.361	198.500	0.100
	High	4.29	0.388		
Networking cap.	Low	4.40	0.499	253.000	0.631
	High	4.51	0.369		
HRM cap.	Low	4.42	0.398	212.000	0.175
	High	4.22	0.457		
Organizational cap.	Low	4.60	0.274	215.500	0.201
	High	4.35	0.550		
Financial cap.	Low	4.52	0.285	190.000	0.067
	High	4.26	0.558		
Execution cap.	Low	4.41	0.266	212.000	0.167
	High	4.22	0.419		

Source: research data.
Notes: $N_{LowGroup}$ = 19; $N_{HighGroup}$ = 29.

Table 30 – Reliance on Researchers in Company by Brazilian agtechs

Variable	Group Statistics Group	Mean	Std. Dev.	Mann–Whitney U test U	Sig.
Researchers in company (KTC05)	Low	1.45	0.510	0.000	0.000
	High	3.68	0.690		
Technological cap.	Low	4.47	0.292	240.500	0.455
	High	4.51	0.400		
Marketing cap.	Low	4.48	0.330	267.000	0.863
	High	4.44	0.455		
Innovatiove cap.	Low	4.15	0.376	206.500	0.138
	High	4.30	0.388		
Networking cap.	Low	4.40	0.490	250.000	0.589
	High	4.50	0.352		
HRM cap.	Low	4.38	0.425	219.000	0.226
	High	4.22	0.453		
Organizational cap.	Low	4.58	0.407	193.500	0.079
	High	4.35	0.507		
Financial cap.	Low	4.41	0.439	242.000	0.475
	High	4.30	0.530		
Execution cap.	Low	4.34	0.226	259.000	0.725
	High	4.26	0.476		

Source: research data.
Notes: $N_{LowGroup}$ = 22; $N_{HighGroup}$ = 25.

The results regarding the Network channel (KTC06) indicate that Brazilian agtechs that heavily rely on networks with researchers and/or academics to acquire specialized knowledge tend to have lower levels of HRM (M_{Low} = 4.49; M_{High} = 4.14; Sig. = 0.009), organizational (M_{Low} = 4.61; M_{High} = 4.31; Sig. = 0.038), financial (M_{Low} = 4.53; M_{High} = 4.23; Sig. = 0.039), and execution capabilities (M_{Low} = 4.44; M_{High} = 4.19; Sig. = 0.048). This finding suggests that such firms may experience a reduced development of these four ordinary capabilities if they rely heavily on these networks to design projects and/or solutions (see Table 31).

Furthermore, our findings uncover an intriguing observation: the group that engages most extensively with networks involving academics and/or researchers exhibits lower network capabilities (M_{Low} = 4.60; M_{High} = 4.38; Sig. = 0.017), which may appear counterintuitive. This implies that entrepreneurs who primarily focus on cultivating a network aligned with URCs may inadvertently neglect the development of a broader network involving other stakeholders, leading to diminished levels of network capabilities.

Table 31 – Reliance on Networks by Brazilian agtechs

	Group Statistics			**Mann–Whitney U test**	
Variable	**Group**	**Mean**	**Std. Dev.**	**U**	**Sig.**
Networks (KTC06)	Low	1.65	0.489	0.000	0.000
	High	3.59	0.694		
Technological cap.	Low	4.51	0.300	256.500	0.768
	High	4.45	0.395		
Marketing cap.	Low	4.55	0.273	235.000	0.447
	High	4.39	0.465		
Innovatiove cap.	Low	4.18	0.425	241.000	0.527
	High	4.24	0.361		
Networking cap.	Low	4.60	0.490	160.500	0.017
	High	4.38	0.352		
HRM cap.	Low	4.49	0.352	149.500	0.009
	High	4.14	0.443		
Organizational cap.	Low	4.61	0.335	174.500	0.038
	High	4.31	0.528		
Financial cap.	Low	4.53	0.262	175.500	0.039
	High	4.23	0.576		
Execution cap.	Low	4.44	0.291	181.000	0.048
	High	4.19	0.402		

Source: research data.
Notes: $N_{LowGroup}$ = 20; $N_{HighGroup}$ = 27.

The analysis of the HR Training (KTC07) and NTBF Development Programs (KTC08) channels paints a different picture. Our findings suggest that Brazilian agtechs that rely more on training offered by academics and/or researchers to acquire specialized knowledge have higher levels of technological (M_{Low} = 4.37; M_{High} = 4.56; Sig. = 0.025) and innovation (M_{Low} = 4.08; M_{High} = 4.32; Sig. = 0.027) capabilities than other agtechs that rely less on such training. This finding further reinforces the understanding that URCs are a crucial source of technological and innovation knowledge. However, we did not find any significant differences between the groups in terms of other ordinary capabilities, which suggests that the impact of HR Training may be limited to technological and innovation capabilities (Table 32).

Table 32 – Reliance on HR Training by Brazilian agtechs

	Group Statistics			Mann–Whitney U test	
Variable	**Group**	**Mean**	**Std. Dev.**	**U**	**Sig.**
HR Training (KTC07)	Low	1.65	0.489	0.000	0.000
	High	3.43	0.573		
Technological cap.	Low	4.37	0.317	174.500	0.025
	High	4.56	0.361		
Marketing cap.	Low	4.42	0.368	243.000	0.435
	High	4.47	0.421		
Innovation cap.	Low	4.08	0.375	175.500	0.027
	High	4.32	0.362		
Networking cap.	Low	4.43	0.536	276.500	0.941
	High	4.49	0.329		
HRM cap.	Low	4.38	0.393	246.500	0.478
	High	4.25	0.472		
Organizational cap.	Low	4.56	0.288	248.000	0.499
	High	4.37	0.562		
Financial cap.	Low	4.38	0.383	269.000	0.815
	High	4.34	0.549		
Execution cap.	Low	4.35	0.274	268.000	0.796
	High	4.26	0.433		

Source: research data.
Notes: $N_{LowGroup}$ = 20; $N_{HighGroup}$ = 28.

Regarding the NTBF Development Programs channel (KTC08), our results demonstrate that Brazilian agtechs that heavily utilize development programs offered by URCs, such as incubation and/or acceleration, tend to have more advanced innovation capabilities compared to their counterparts (M_{Low} = 4.09; M_{High} = 4.33; Sig. = 0.034). This evidence suggests that such programs are effective in supporting

Brazilian agtechs in developing expertise related to product innovation, process innovation, risk management, among other related areas. However, our findings reveal no significant differences between the groups for other ordinary capabilities (see Table 33). This indicates that higher reliance on NTBF Development Programs alone does not necessarily guarantee the greater development of other capabilities in agtechs.

Table 33 – Reliance on NTBF Development Programs by Brazilian agtechs

	Group Statistics			Mann–Whitney U test	
Variable	**Group**	**Mean**	**Std. Dev.**	**U**	**Sig.**
NTBF Development Programs (KTC08)	Low	1.00	0.000	0.000	0.000
	High	3.23	1.107		
Technological cap.	Low	4.50	0.294	281.000	0.916
	High	4.46	0.403		
Marketing cap.	Low	4.51	0.360	254.500	0.511
	High	4.41	0.427		
Innovatiove cap.	Low	4.09	0.348	185.000	0.034
	High	4.33	0.383		
Networking cap.	Low	4.45	0.497	279.000	0.883
	High	4.48	0.359		
HRM cap.	Low	4.36	0.407	245.000	0.390
	High	4.25	0.470		
Organizational cap.	Low	4.52	0.437	238.500	0.320
	High	4.38	0.501		
Financial cap.	Low	4.41	0.421	258.000	0.556
	High	4.32	0.534		
Execution cap.	Low	4.36	0.325	236.000	0.286
	High	4.24	0.409		

Source: research data.
Notes: $N_{LowGroup} = 22$; $N_{HighGroup} = 26$.

To validate the results of the Mann–Whitney U tests, we conducted a Spearman correlation analysis between ordinary capabilities and knowledge transfer channels. While this analysis does not establish causation, it helps to identify the degree to which changes in one variable are associated with changes in another variable, shedding light on the relationship between the two variables and the underlying behavioral patterns.

Table 34 shows that there are no significant correlations between KTC01, KTC02, KTC03, and KTC05 and the ordinary capabilities of Brazilian agtechs. This finding is consistent with the results of the Mann–Whitney U tests, indicating that knowledge transferred through Services and Consultancies, Joint R&D, Joint

Publication, and Researchers in Company does not contribute significantly to the development of ordinary capabilities in Brazilian agtechs.

Table 34 – Spearman correlations between KTCs and Agtech Capabilities in Brazil

Variables	Knowledge Transfer Channels (KTCs)							
	KTC01	**KTC02**	**KTC03**	**KTC04**	**KTC05**	**KTC06**	**KTC07**	**KTC08**
Technolog. Cap.	0.026	0.207	0.068	0.091	0.190	0.123	**0.293**	0.030
Marketing Cap.	0.028	-0.122	-0.104	-0.196	0.080	-0.127	0.161	-0.208
Innovation Cap.	0.163	0.063	0.102	**0.284**	0.169	0.164	**0.406**	**0.292**
Networking Cap.	0.012	-0.110	0.093	-0.113	0.027	-0.237	0.019	-0.087
HRM Cap	-0.003	-0.131	0.097	**-0.332**	-0.085	**-0.308**	-0.099	-0.170
Organiz. Cap.	-0.202	-0.122	0.023	-0.194	-0.202	-0.175	-0.020	-0.184
Financial Cap.	-0.126	-0.235	-0.184	**-0.304**	-0.110	-0.155	0.041	-0.170
Execution Cap.	-0.206	-0.062	-0.004	-0.265	-0.094	-0.236	-0.041	-0.129

Source: Research data.
Notes: Correlations that are statistically significant at the 5% level are denoted in bold in the correlation matrix. To aid in comprehension, negative correlations are highlighted in shades of red, while positive correlations are highlighted in shades of green. The color intensities correspond to the effect sizes, with stronger colors representing larger effect sizes. This visual aid helps to easily identify and interpret the strength and direction of the relationships between the variables.

The Spearman correlation analysis further unveiled some noteworthy associations. Specifically, there was a negative correlation between Student Placement (KTC04) and financial capabilities ($\rho = -0.304$; Sig. < 0.05), while a positive correlation was observed with innovation capabilities ($\rho = 0.284$; Sig. < 0.05). These correlations align with the results obtained from the Mann–Whitney U tests and offer a consistent perspective. They indicate that when organizations prioritize student placement as a primary strategy for team building and fostering innovation capabilities, there may be a potential trade-off, wherein the development of crucial capabilities such as financial capabilities could be compromised.

Moreover, the correlation tests revealed a significant negative correlation between Student Placement and HRM capabilities ($\rho = -0.332$; Sig. < 0.05). The Mann–Whitney U tests, which compared the means of groups with low and high reliance on Student Placement for these capabilities, showed a mathematical difference that was consistent with the correlation outcomes. However, this difference was not statistically significant. Therefore, while both pieces of evidence point in the same direction, we cannot definitively conclude whether these relationships are consistent or not. Future studies could replicate these tests in larger samples to further investigate these findings.

The correlation analyses for KTCs 06, 07, and 08 confirmed the Mann–Whitney U tests. The results indicated a negative correlation between the Networking channel (KTC06) and networking (ρ = -0.237; Sig. > 0.05), HRM (ρ = -0.308; Sig. < 0.05), organizational (ρ = -0.175; Sig. > 0.05), and execution capabilities (ρ = -0.236; Sig. > 0.05), even though not all of the coefficients achieved the required level of statistical significance (Sig. < 0.05). This finding reinforces the concerns previously raised about the potential of networking as a URC channel to support the development of Agtech capabilities in the Brazilian context. Finally, the correlations also confirmed a positive relationship between HR Training (KTC07) and technological (ρ = 0.293; Sig. < 0.05) and innovation capabilities (ρ = 0.406; Sig. < 0.05), as well as a positive relationship between NTBF Development Programs and innovation capabilities (ρ = 0.292; Sig. < 0.05).

Overall, our analysis suggests that HR Training and NTBF Development Programs are the most effective knowledge transfer channels (KTCs) for supporting the development of capabilities in Brazilian agtechs. Specifically, our findings indicate that agtechs that rely more on HR Training tend to have well-developed technological and innovation capabilities, while those that use NTBF Development Programs more tend to have better innovation capabilities.

However, our results also highlight the importance of caution when establishing networks for project and/or joint solutions development with universities and research centers (URCs). We found that a higher dedication to these networks can hinder the development of ordinary capabilities, which are crucial to the performance of Brazilian agtechs.

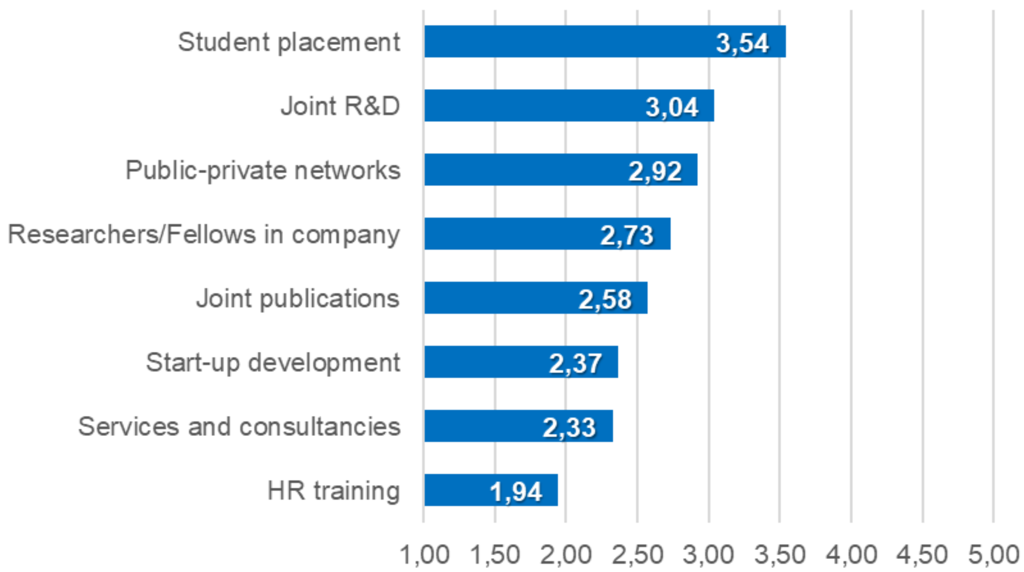
The implications of our findings are important for agtechs in Brazil, as they highlight the need to consider the effectiveness of multiple KTCs for capability development, instead of relying solely on a specific KTC. In our subsequent analyses, we further examine the effectiveness of different KTCs for capability development in French agtechs.

4.1.2 French agtechs and URC Knowledge Transfer Channels

As previously mentioned, both French and Brazilian agtech companies demonstrate a relatively low reliance on URC knowledge transfer. However, French agtechs generally rely more heavily on knowledge from URCs compared to their Brazilian counterparts. Furthermore, there are differences in usage patterns between the two samples, as depicted in Figure 16. On average, French agtechs tend to rely more on Student Placement (3.54) and Joint R&D (3.04) but less on HR Training (1.94) (Figure 18). These findings suggest that while certain KTCs are more frequently utilized than others, overall, agtech firms in both countries have a limited reliance on URC knowledge transfer channels.

Although agtech companies in France, like their Brazilian counterparts, make relatively little use of knowledge transfer channels, our research provides consistent evidence that URC knowledge can play a significant role in supporting the development of ordinary capabilities. Specifically, our findings indicate that French agtechs that make greater use of certain types of KTCs tend to have more highly developed ordinary capabilities. These outcomes substantiate Proposition 3, thereby illustrating that knowledge transfer channels yield diverse outcomes with respect to capability development across varying contexts.

Figure 18 – The reliance of French agtechs on Knowledge Transfer Channels



Source: elaborated from the research data.

Our analysis of French agtechs' reliance on Services and Consultancies (KTC01) reveals that despite registering the second lowest average usage among the KTCs, those agtechs that make a higher use of this channel tend to have better levels of network capabilities (M_{Low} = 3.96; M_{High} = 4.32; Sig. = 0.029), HRM capabilities (M_{Low} = 3.69; M_{High} = 4.12; Sig. = 0.009), and financial capabilities (M_{Low} = 3.83; M_{High} = 4.33; Sig. = 0.001) when compared to those who use this mechanism less (see Table 35). This result is consistent with our initial hypothesis that the effectiveness of KTCs may depend on specific contextual factors. These findings contradict the results of the Brazilian sample, in which Services and Consultancies were found to be ineffective in supporting the development of ordinary capabilities. Therefore, our research reinforces the importance of assessing the effectiveness of different KTCs in different contexts to ensure their optimal utilization.

Table 35 – Reliance on Services and Consultancies by French agtechs

Group Statistics				Mann–Whitney U test	
Variable	**Group**	**Mean**	**Std. Dev.**	**U**	**Sig.**
Services and Consultancies (KTC01)	Low	1.50	0.508	0.000	0.000
	High	3.89	0.900		
Technological cap.	Low	4.28	0.551	281.000	0.627
	High	4.31	0.652		
Marketing cap.	Low	3.73	0.567	296.500	0.854
	High	3.75	0.664		
Innovation cap.	Low	3.95	0.656	284.500	0.677
	High	3.91	0.720		
Networking cap.	Low	3.96	0.543	193.500	0.029
	High	4.32	0.505		
HRM cap.	Low	3.69	0.523	170.000	0.009
	High	4.12	0.659		
Organizational cap.	Low	3.56	0.560	284.500	0.677
	High	3.69	0.659		
Financial cap.	Low	3.83	0.583	137.000	0.001
	High	4.33	0.531		
Execution cap.	Low	3.57	0.661	226.000	0.121
	High	3.90	0.708		

Source: research data.
Notes: $N_{LowGroup}$ = 34; $N_{HighGroup}$ = 18.

Regarding the Joint R&D channel (KTC02), our analysis revealed significant differences compared to the Brazilian sample. In France, we found that agtechs that engage in more research and development (R&D) projects in collaboration with researchers and/or academics tend to have more highly developed technological (M_{Low} = 4.12; M_{High} = 4.53; Sig. = 0.004) and HRM capabilities (M_{Low} = 3.69; M_{High} = 4.04; Sig. = 0.036). These results suggest that Joint R&D can be an effective mechanism for enhancing the capabilities of agtechs in France, underscoring the importance of this KTC in the French context (Table 36).

Table 36 – Reliance on Joint R&D by French agtechs

	Group Statistics			Mann–Whitney U test	
Variable	**Group**	**Mean**	**Std. Dev.**	**U**	**Sig.**
Joint R&D (KTC02)	Low	1.90	0.845	0.000	0.000
	High	4.59	0.503		
Technological cap.	Low	4.12	0.607	177.500	0.004
	High	4.53	0.460		
Marketing cap.	Low	3.70	0.634	301.500	0.595
	High	3.79	0.548		
Innovation cap.	Low	3.83	0.733	271.500	0.275
	High	4.08	0.561		
Networking cap.	Low	3.98	0.611	252.500	0.148
	High	4.24	0.430		
HRM cap.	Low	3.69	0.623	217.500	0.036
	High	4.04	0.527		
Organizational cap.	Low	3.63	0.567	312.000	0.737
	High	3.58	0.638		
Financial cap.	Low	3.94	0.608	273.500	0.292
	High	4.09	0.616		
Execution cap.	Low	3.65	0.712	316.000	0.794
	High	3.73	0.672		

Source: research data.
Notes: $N_{LowGroup}$ = 30; $N_{HighGroup}$ = 22.

In contrast to the outcomes observed for the Services and Consultancies as well as Joint R&D channels, a higher dependence on the Joint Publications channel (KTC03) did not correspond to a notably enhanced development of ordinary capabilities among French agtech firms. Our findings only revealed evidence, albeit at the 10% significance level, indicating that agtechs relying more on joint publications with URCs tend to exhibit more developed financial capabilities (M_{Low} = 3.88; M_{High} = 4.15; Sig. = 0.098). However, it's essential to approach this evidence with caution due to the modest level of significance.

Overall, these results align with those uncovered in the Brazilian sample, suggesting that the Joint Publications channel may not serve as a highly effective mechanism for transferring knowledge from URCs to bolster the development of ordinary capabilities in agtech firms, as presented in Table 37.

Table 37 – Reliance on Joint Publications by French agtechs

	Group Statistics			Mann–Whitney U test	
Variable	**Group**	**Mean**	**Std. Dev.**	**U**	**Sig.**
Joint publications (KTC03)	Low	1.46	0.508	0.000	0.000
	High	3.88	0.900		
Technological cap.	Low	4.21	0.657	296.500	0.464
	High	4.39	0.474		
Marketing cap.	Low	3.77	0.608	311.500	0.651
	High	3.70	0.592		
Innovation cap.	Low	3.82	0.763	279.500	0.296
	High	4.07	0.533		
Networking cap.	Low	3.99	0.602	270.500	0.226
	High	4.20	0.475		
HRM cap.	Low	3.74	0.567	266.000	0.197
	High	3.94	0.640		
Organizational cap.	Low	3.64	0.577	309.000	0.618
	High	3.57	0.620		
Financial cap.	Low	3.88	0.645	246.500	0.098
	High	4.15	0.545		
Execution cap.	Low	3.63	0.675	305.500	0.573
	High	3.75	0.715		

Source: research data.
Notes: $N_{LowGroup}$ = 28; $N_{HighGroup}$ = 24.

Our analysis of the Student Placement channel (KTC04) did not uncover compelling evidence that a higher utilization of this mechanism leads to better levels of ordinary capabilities in French agtechs. The results presented in Table 38 indicate that there are no significant differences in the development of ordinary capabilities between the groups of agtechs that heavily rely on this KTC and those that rely less on it. These findings suggest that although student placement may have benefits in other contexts, it may not be an effective means of enhancing ordinary capabilities for French agtechs.

However, our research found that French agtechs that rely the most on the Researchers in Company channel (KTC05) have two particularly developed ordinary capabilities (Table 39): financial (M_{Low} = 3.83; M_{High} = 4.15; Sig. = 0.053) and HRM (M_{Low} = 3.61; M_{High} = 4.03; Sig. = 0.012) capabilities. This suggests that hiring researchers and academics to solve specific problems for firms has a positive side effect on the development of these capabilities. While these professionals provide the services they were hired for, they also transfer other knowledge related to the aspects of financial and human resource management, which has led to an increase in these capabilities among French agtechs. Moreover, we found evidence that networking (M_{Low} = 3.92; M_{High} = 4.24; Sig. = 0.062) and execution (M_{Low} = 3.50; M_{High} = 3.84; Sig. = 0.091) capabilities also seem to be higher among agtechs that rely more on this KTC, although this evidence was only significant at the 10% level, which limits the statistical consistency of this finding.

Table 38 – Reliance on Student Placement by French agtechs

	Group Statistics			Mann–Whitney U test	
Variable	**Group**	**Mean**	**Std. Dev.**	**U**	**Sig.**
Student placement (KTC04)	Low	2.24	0.831	0.000	0.000
	High	4.42	0.502		
Technological cap.	Low	4.20	0.525	252.500	0.169
	High	4.35	0.617		
Marketing cap.	Low	3.81	0.593	282.500	0.420
	High	3.69	0.602		
Innovation cap.	Low	3.91	0.703	320.500	0.925
	High	3.95	0.661		
Networking cap.	Low	4.00	0.600	275.000	0.343
	High	4.15	0.519		
HRM cap.	Low	3.86	0.525	311.000	0.786
	High	3.82	0.661		
Organizational cap.	Low	3.59	0.515	312.500	0.807
	High	3.62	0.647		
Financial cap.	Low	4.06	0.633	296.000	0.579
	High	3.97	0.602		
Execution cap.	Low	3.67	0.577	323.500	0.970
	High	3.69	0.766		

Source: research data.
Notes: $N_{LowGroup}$ = 21; $N_{HighGroup}$ = 31.

In relation to the Networks channel (KTC06), our analysis found that French agtechs that establish more networking ties with universities and research centers (URCs) to obtain specialized knowledge also tend to have greater human resource management (HRM) capabilities (M_{Low} = 3.60; M_{High} = 4.04; Sig. = 0.010). Moreover, our research showed that the Networks channel is an important means for French agtechs to acquire more technological knowledge, leading to an increase in their technological capabilities (M_{Low} = 4.10; M_{High} = 4.46; Sig. = 0.029).

Table 39 – Reliance on Researchers in Company by French agtechs

	Group Statistics			Mann–Whitney U test	
Variable	**Group**	**Mean**	**Std. Dev.**	**U**	**Sig.**
Researchers in Company (KTC05)	Low	1.46	0.509	0.000	0.000
	High	3.82	0.772		
Technological cap.	Low	4.23	0.674	315.000	0.697
	High	4.34	0.495		
Marketing cap.	Low	3.80	0.512	283.500	0.332
	High	3.68	0.663		
Innovation cap.	Low	3.81	0.642	254.000	0.129
	High	4.04	0.689		
Networking cap.	Low	3.92	0.618	235.000	0.062
	High	4.24	0.449		
HRM cap.	Low	3.61	0.613	199.000	0.012
	High	4.03	0.535		
Organizational cap.	Low	3.56	0.471	325.500	0.846
	High	3.64	0.686		
Financial cap.	Low	3.83	0.600	231.500	0.053
	High	4.15	0.590		
Execution cap.	Low	3.50	0.699	244.500	0.091
	High	3.84	0.653		

Source: research data.
Notes: $N_{LowGroup}$ = 24; $N_{HighGroup}$ = 28.

Furthermore, as shown in Table 40, our analysis revealed that French agtechs that heavily rely on these networks have higher execution (M_{Low} = 3.51; M_{High} = 3.83; Sig. = 0.096) and financial capabilities (M_{Low} = 3.88; M_{High} = 4.11; Sig. = 0.070), although this outcome is only significant at the 10% level. This finding suggests that the Networks channel not only enhances technological and HRM capabilities but could also lead to better execution and financial capabilities for French agtechs.

Our analysis also indicates, as shown in Table 41, that French agtechs that utilize HR Training (KTC07) have greater financial capabilities (M_{Low} = 3.80; M_{High} = 4.22; Sig. = 0.023). This finding suggests that the training offered by academics and researchers may improve the ability of French agtechs to capture and leverage available financial resources.

Table 40 – Reliance on Networks by French agtechs

	Group Statistics			Mann–Whitney U test	
Variable	**Group**	**Mean**	**Std. Dev.**	**U**	**Sig.**
Networks (KTC06)	Low	1.50	0.511	0.000	0.000
	High	4.14	0.848		
Technological cap.	Low	4.10	0.651	218.500	0.029
	High	4.46	0.465		
Marketing cap.	Low	3.76	0.640	321.500	0.789
	High	3.71	0.566		
Innovation cap.	Low	3.86	0.752	303.000	0.541
	High	4.00	0.601		
Networking cap.	Low	3.97	0.634	267.500	0.205
	High	4.19	0.457		
HRM cap.	Low	3.60	0.617	195.500	0.010
	High	4.04	0.526		
Organizational cap.	Low	3.60	0.560	334.500	0.978
	High	3.61	0.629		
Financial cap.	Low	3.88	0.664	238.000	0.070
	High	4.11	0.548		
Execution cap.	Low	3.51	0.697	246.000	0.096
	High	3.83	0.660		

Source: research data.
Notes: $N_{LowGroup} = 24$; $N_{HighGroup} = 28$.

Moreover, our research found evidence that French agtechs that utilize HR Training (KTC07) have better organizational capabilities ($M_{Low} = 3.44$; $M_{High} = 3.78$; Sig. = 0.103), although this finding is only significant at the 10% level. Despite the limitation in terms of statistical consistency, this result suggests that the HR Training channel could have a positive impact on other ordinary capabilities beyond financial capabilities. This suggests that the training imparted by academics and researchers can significantly bolster the ability of French agtechs to structure their operations, establish effective communication channels, and implement monitoring mechanisms – all of which are pivotal for the success of these firms.

Finally, the results presented in Table 42 suggest that French agtechs that rely more on NTBF Development Programs do not necessarily have better ordinary capabilities. This finding is surprising considering that incubation and acceleration programs offered by URCs with the intention of developing NTBFs are expected to leverage the necessary capabilities to improve the performance of agtechs. However, we did find evidence, although only significant at the 10% level, that agtechs that rely more on the NTBF Development Programs channel have better developed technological capabilities (M_{Low} = 4.17; M_{High} = 4.46; Sig. = 0.055). While this discovery holds intrigue, it is imperative to exercise caution when interpreting it, primarily due to the analysis's relatively modest level of statistical significance.

Table 41 – Reliance on HR Training by French agtechs

	Group Statistics			Mann–Whitney U test	
Variable	**Group**	**Mean**	**Std. Dev.**	**U**	**Sig.**
HR training (KTC07)	Low	1.00	0.000	0.000	0.000
	High	2.96	0.889		
Technological cap.	Low	4.22	0.606	292.000	0.400
	High	4.37	0.556		
Marketing cap.	Low	3.62	0.487	259.500	0.151
	High	3.86	0.682		
Innovation cap.	Low	3.79	0.654	255.500	0.130
	High	4.10	0.666		
Networking cap.	Low	4.01	0.531	285.500	0.337
	High	4.18	0.572		
HRM cap.	Low	3.70	0.582	257.000	0.139
	High	3.98	0.607		
Organizational cap.	Low	3.44	0.476	249.000	0.103
	High	3.78	0.663		
Financial cap.	Low	3.80	0.579	214.000	0.023
	High	4.22	0.575		
Execution cap.	Low	3.53	0.695	251.000	0.111
	High	3.85	0.657		

Source: research data.
Notes: $N_{LowGroup}$ = 27; $N_{HighGroup}$ = 25.

To further validate the results of the Mann–Whitney U tests for the French sample, we conducted a Spearman correlation analysis between ordinary capabilities and knowledge transfer channels, similar to the analysis conducted for the Brazilian sample. The findings, as presented in Table 43, indicate that networking (ρ = 0.362; Sig. < 0.05), HRM (ρ = 0.402; Sig. < 0.05), and financial (ρ = 0.452; Sig. < 0.05) capabilities are positively correlated with the reliance of French agtechs on Services and Consultancies (KTC01), while we did not find any other significant correlations between other ordinary capabilities and KTC01. This result is consistent with the results of the Mann–Whitney U test, further supporting the validity of our findings regarding this knowledge transfer channel for French agtechs.

Table 42 – Reliance on NTBF Development Programs by French agtechs

Variable	Group Statistics			Mann–Whitney U test	
	Group	Mean	Std. Dev.	U	Sig.
NTBF Development Programs (KTC08)	Low	1.30	0.466	0.000	0.000
	High	3.82	0.853		
Technological cap.	Low	4.17	0.585	227.500	0.055
	High	4.46	0.543		
Marketing cap.	Low	3.70	0.526	289.500	0.451
	High	3.79	0.688		
Innovation cap.	Low	3.89	0.723	317.500	0.815
	High	4.00	0.605		
Networking cap.	Low	4.09	0.517	324.500	0.918
	High	4.08	0.610		
HRM cap.	Low	3.80	0.528	301.500	0.596
	High	3.89	0.706		
Organizational cap.	Low	3.57	0.467	316.000	0.794
	High	3.66	0.739		
Financial cap.	Low	3.93	0.600	278.500	0.336
	High	4.10	0.626		
Execution cap.	Low	3.61	0.688	295.000	0.514
	High	3.78	0.696		

Source: research data.
Notes: $N_{LowGroup}$ = 30; $N_{HighGroup}$ = 22.

Table 43 – Spearman correlations between KTCs and Agtech Capabilities in France

Variables	Knowledge Transfer Channels (KTCs)							
	KTC01	KTC02	KTC03	KTC04	KTC05	KTC06	KTC07	KTC08
Technolog. Cap.	0,150	**0,332**	0,143	0,097	0,129	**0,359**	0,206	0,254
Marketing Cap.	0,009	0,040	-0,111	-0,155	-0,174	-0,061	0,260	0,134
Innovation Cap.	0,094	0,068	0,134	-0,060	0,202	0,140	**0,270**	0,001
Networking Cap.	**0,336**	0,163	0,212	0,229	0,210	0,173	0,250	0,049
HRM Cap	**0,402**	**0,296**	0,050	-0,123	**0,338**	0,261	**0,320**	0,037
Organiz. Cap.	0,068	-0,123	-0,185	-0,074	0,050	-0,058	**0,286**	-0,022
Financial Cap.	**0,452**	0,183	0,038	-0,089	**0,352**	0,180	**0,386**	0,136
Execution Cap.	0,244	0,095	0,017	-0,075	**0,322**	0,236	**0,276**	0,011

Source: Research data.
Notes: Correlations that are statistically significant at the 5% level are denoted in bold in the correlation matrix. To aid in comprehension, negative correlations are highlighted in shades of red, while positive correlations are highlighted in shades of green. The color intensities correspond to the effect sizes, with stronger colors representing larger effect sizes. This visual aid helps to easily identify and interpret the strength and direction of the relationships between the variables.

The correlation analysis further confirmed the results of the Mann–Whitney U tests conducted for Joint R&D (KTC02). We observed a significant positive correlation between KTC02 and technological capabilities (ρ = 0.332; Sig. < 0.05), as well as between KTC02 and HRM capabilities (ρ = 0.296; Sig. < 0.05). Conversely, we did not find any significant correlations between KTC02 and other ordinary capabilities, which is consistent with the earlier findings.

Our analysis also revealed that there were no significant correlations between the reliance on Joint Publications (KTC03), Student Placement (KTC04), and NTBF Development Programs (KTC08) channels and the development of the ordinary capabilities analyzed. This finding is consistent with the results of the Mann–Whitney U tests, which demonstrated that utilizing these knowledge transfer channels does not necessarily lead to better capabilities for French agtechs. Therefore, the hypothesis of a potential relationship between the reliance on NTBF Development Programs (KTC08) and the development of technological capabilities (ρ = 0.254; Sig. > 0.05), which was suggested by the Mann–Whitney U tests, was contested by these new findings.

Our correlation analysis reaffirms the findings derived from the Mann–Whitney U tests pertaining to the Researchers in Company channel (KTC05). This new evidence lends substantial support to the conclusion that reliance on this knowledge transfer channel can indeed foster the development of superior HRM capabilities, as we have detected a positive and statistically significant correlation between these variables (ρ = 0.338; Sig. < 0.05). Furthermore, our research has unveiled positive correlations between financial capabilities and KTC05 (ρ = 0.352; Sig. < 0.05), which aligns with the outcomes of the Mann–Whitney U tests.

Additionally, we have observed positive correlations between execution capabilities and KTC05 (ρ = 0.322; Sig. < 0.05). These findings lend credence to the notion of a favorable relationship between the utilization of KTC05 and the enhancement of these capabilities within French agtechs. Lastly, we also observed a positive correlation between network capabilities and the utilization of the KTC05 (ρ = 0.210; Sig. > 0.05), although it was not significant at the 5% level. This evidence suggests a potential relationship between these variables that warrants further investigation through additional analysis.

Regarding the Networks channel (KTC06), our correlation analysis found a positive and significant relationship between reliance on this channel and technological capabilities ($\rho = 0.359$; Sig. < 0.05), which supports the results of the Mann–Whitney U tests. However, we did not observe a significant correlation between KTC06 and HRM capabilities at the 5% level ($\rho = 0.261$; Sig. > 0.05), which does not negate the Mann–Whitney U findings but suggests the need for further analysis to confirm the relationship.

The correlation analysis of HR Training (KTC07) fully supports the results of the Mann–Whitney U tests. We observed positive and significant correlations between KTC07 and financial capabilities ($\rho = 0.386$; Sig. < 0.05). Furthermore, we observed significant positive correlations between HR Training and innovation ($\rho = 0.270$; Sig. < 0.05), HRM ($\rho = 0.320$; Sig. < 0.05), organizational capabilities ($\rho = 0.286$; Sig. < 0.05), and execution capabilities ($\rho = 0.276$; Sig. < 0.05), suggesting a possible positive relationship between KTC07 and these four capabilities. Nevertheless, it is imperative to exercise caution when interpreting these results, as we did not identify significant differences in the Mann–Whitney U tests among the various groups associated with KTC07 and these capabilities.

In our analytical framework, we have exclusively included channels that exhibit noteworthy differences at the 5% significance level in the Mann–Whitney U tests, and these selections have been further validated by the correlation tests before being incorporated into our analysis. Moreover, considering the specific focus of this research, we have deliberately concentrated on channels known to support capability development, omitting any potential adverse effects of networks with URCs (KTC06) on capacity development. Therefore, to bolster the robustness of our analysis, future research should involve larger sample sizes and delve deeper into investigating the potential negative impacts of certain KTCs on capacity development.

4.1.3 Knowledge Transfer in Agtech Industry: A Comparative Analysis of Brazil and France

Our analysis highlights the significant differences in how knowledge transfer from universities and research centers (URCs) can lead to improved ordinary capabilities in Brazilian and French agtechs, emphasizing the importance of considering the territorial context. To fully comprehend the phenomenon of knowledge transfer, it is necessary to view it as a complex system of multiple channels, each with its unique ways of transferring knowledge and resulting in different outcomes for agtechs beyond the academic-scientific context. Therefore, it is crucial to carefully evaluate the effectiveness of different knowledge transfer channels in enhancing the ordinary capabilities of agtechs, instead of assuming that all channels will be equally effective in achieving this goal.

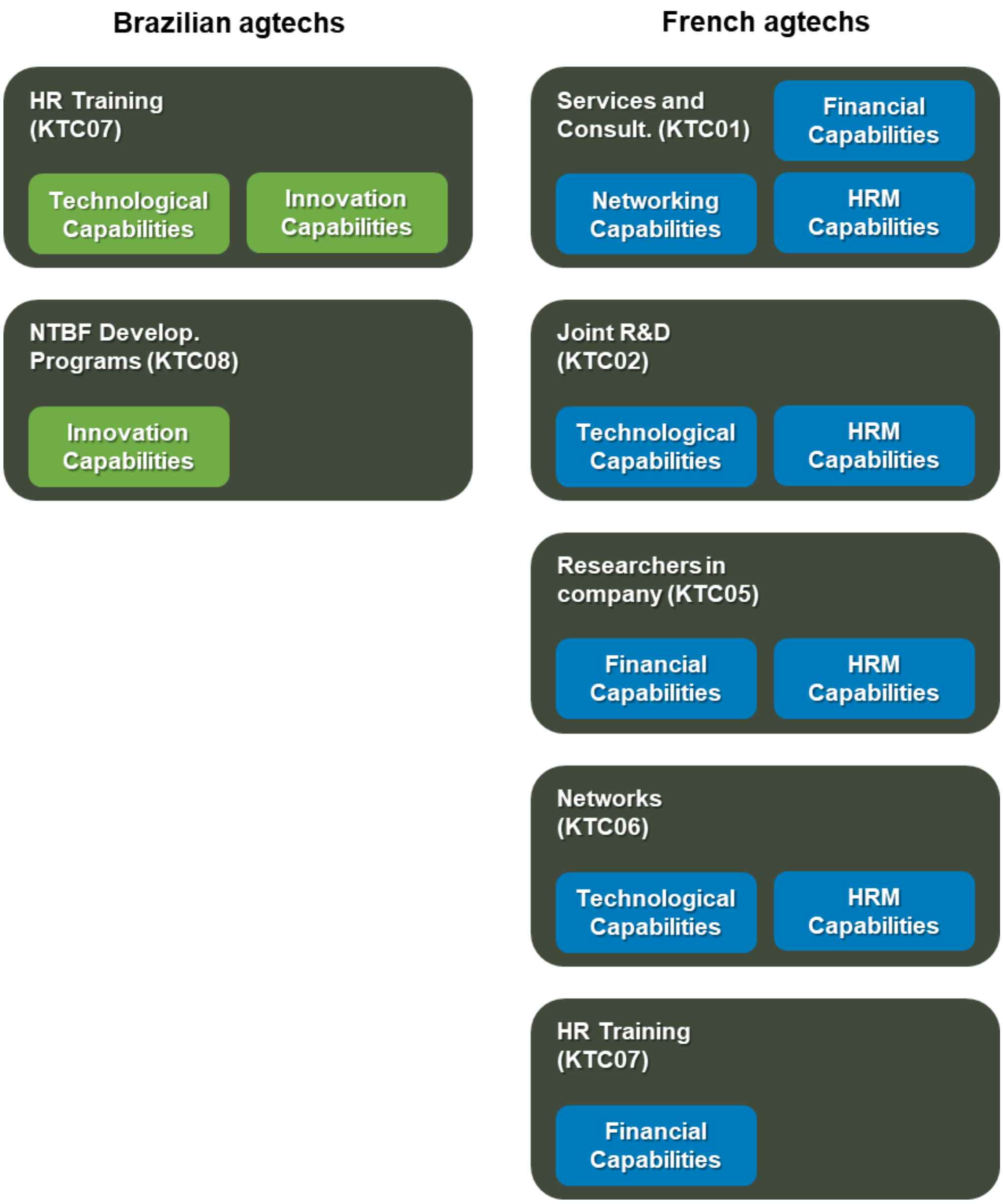
Our results indicate that in Brazil, only two KTCs – HR Training and NTBF Development Programs – appear to be effective in promoting the development of ordinary capabilities. Specifically, agtechs that rely more on HR Training tend to have better technological innovation capabilities, while those using NTBF Development Programs tend to have better innovation capabilities overall. However, other KTCs did not show a consistent impact on capability development.

On the other hand, in the French sample, our analysis revealed that knowledge transfer from URCs is more comprehensive and effective in supporting the development of ordinary capabilities in agtechs. Among the eight transfer channels analyzed, we found that five channels were effective in developing specific capabilities: technological, networking, HRM, organizational, and financial capabilities (Figure 19).

This result suggests that French agtechs have more diversified options to access knowledge transfer from URCs, leading to a more comprehensive development of ordinary capabilities. However, despite the broader spectrum of effective transfer channels, our results also showed that, as in Brazil, the average reliance of French agtechs on these channels was relatively low. This finding highlights the potential benefits of further promoting collaborations between agtechs and URCs to enhance knowledge transfer and strengthen the capabilities and performance of both French and Brazilian agtechs.

In summary, our findings underscore that Brazilian and French agtechs should rely on different KTCs to develop specific ordinary capabilities, as illustrated in Figure 19. By understanding which KTCs are most effective for developing specific capabilities, agtech entrepreneurs can make informed decisions and optimize their resource allocation to enhance their capabilities and performance.

Figure 19 – Comparing the role of KTCs in capability development



Source: Elaborated from the research data.

4.2 FSQCA NECESSITY ANALYSIS

In this section, we present the results of our fsQCA necessity analysis, which allowed us to address the second specific objective of our research. Through this analysis, we investigated whether the presence or absence of each of the eight ordinary capabilities alone is sufficient to achieve high levels of performance in agtechs. Overall, our results confirmed our initial assumptions that no single ordinary capability alone can lead to high performance in Brazilian and French agtechs. Despite all the ordinary capabilities being relatively well-developed in the analyzed agtechs, they are not capable of generating the expected level of performance when considered in isolation.

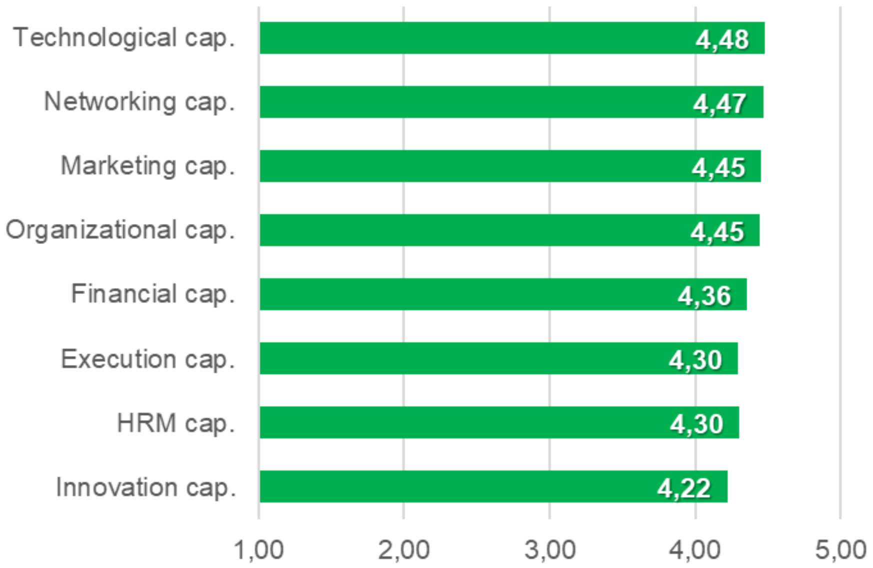
This finding enriches the understanding of the resource-based view (RBV) theory. Our results challenge the conventional RBV notion that the mere possession of valuable resources—in this case, well-developed ordinary capabilities—is sufficient for NTBFs to achieve exceptional performance. Instead, our data indicates that successful agtechs need not only possess valuable resources but also understand how to strategically configure them to enhance performance. Thus, a more intricate and dynamic perspective of RBV, one that takes into account how firms orchestrate their resources, should be considered. Detailed analysis supporting these conclusions for both Brazilian and French agtechs will be presented in the following sections.

4.2.1 fsQCA Necessity Analysis: Key findings for Brazilian agtechs

In our analysis of the data collected in Brazil, we found that the growing agtechs in the country have well-developed ordinary capabilities, which confirms our initial assumptions. Notably, technological and network capabilities are among the most highly developed. On a 5-point scale, we found that the average technological capabilities is 4.48, and the average network capabilities is 4.47, as depicted in Figure 20. The least developed capability in these companies is innovation capabilities, which has an average score of 4.22.

This finding may seem to challenge the fundamental premise of NTBFs, which emphasizes the importance of developing innovative solutions as the foundation of a repeatable, scalable, and profitable business model. However, it is important to note that even though innovation capabilities are the least developed among other ordinary capabilities, they still have a relatively high level of development. This suggests that agtechs in Brazil possess some level of innovation capabilities, which are required to develop innovative solutions and achieve high levels of performance.

Figure 20 – Descriptive statistics of ordinary capabilities in Brazilian agtechs



Source: Elaborated from the research data.

Regarding the necessity analysis presented in Table 44, the results indicate that the presence or absence of each causal condition did not reach consistency levels equal to or greater than 90%, suggesting that none of the causal conditions on their own are sufficient to generate the desired outcome (i.e., agtech performance). The condition of necessity would imply that the presence or absence of a specific ordinary capability alone could lead at least 9 out of 10 analyzed cases to high levels of agtech performance.

Furthermore, it is important to note that none of the causal conditions even achieved the 80% consistency level, which is considered a quasi-necessary condition. Although organizational capabilities (78.5%) and execution capabilities (77.5%) showed the highest levels of consistency, these levels do not guarantee the necessary condition for these capabilities to lead to high agtech performance. Therefore, this finding supports Proposition 1.

Table 44 – Necessity analysis for Brazilian agtechs

Causal Condition	Presence or Absence	Consistency	Coverage
Technological Capabilities (TEC)	TEC	0.706	0.786
	~TEC	0.557	0.563
Marketing Capabilities (MKT)	MKT	0.774	0.791
	~MKT	0.532	0.586
Innovation Capabilities (INN)	INN	0.739	0.781
	~INN	0.532	0.565
Networking Capabilities (NET)	NET	0.761	0.703
	~NET	0.492	0.612
HRM Capabilities (HRM)	HRM	0.711	0.723
	~HRM	0.559	0.620
Organizational Cap. (ORG)	ORG	0.785	0.741
	~ORG	0.520	0.629
Financial Capabilities (FIN)	FIN	0.754	0.719
	~FIN	0.557	0.666
Execution Capabilities (EXC)	EXC	0.775	0.730
	~EXC	0.528	0.640

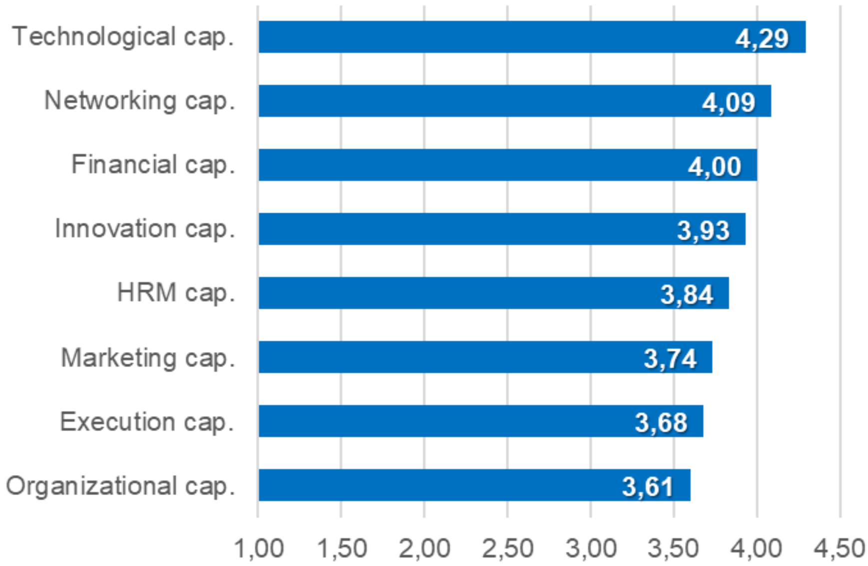
Source: Research data.
Notes: Outcome variable: Agtech Performance (PERF). The tilde symbol (~) before the causal condition represents the absence of the condition.

4.2.2 fsQCA Necessity Analysis: Key findings for French agtechs

In our analysis of the data collected in France, we found that French agtechs also have well-developed ordinary capabilities, similar to the Brazilian sample. Notably, technological and network capabilities were still the most highly developed, although the average scores were slightly lower compared to the Brazilian sample. On a 5-point scale, we found that the average technological capabilities score is 4.29, and the average network capabilities score is 4.09, as depicted in Figure 21. However, in the French context, the least developed capability among the ordinary capabilities was organizational capabilities, which had an average score of 3.61.

The results indicate that both French and Brazilian agtechs prioritize the development of technological and network capabilities. However, the analysis reveals some differences in the third-place ranking. For French agtechs, financial capabilities are the third most developed ordinary capability, with an average score of 4.00. In contrast, Brazilian agtechs prioritize their marketing capabilities, with an average score of 4.45. These differences may reflect the priorities of agtechs in each context. French agtechs may have more access to capital for business development, leading to more focus on financial capabilities. In contrast, Brazilian agtechs may need to prioritize the development of marketing capabilities to compensate for the lack of financial resources and go to market earlier.

Figure 21 – Descriptive statistics of ordinary capabilities in French agtechs



Source: Elaborated from the research data.

The results of the necessity analysis, as shown in Table 45, reveal that the presence or absence of any of the causal conditions included in the analysis did not reach the minimum consistency level to be considered necessary (90%), or even quasi-necessary (80%). The two conditions that achieved the highest level of consistency were the presence of HRM capabilities (76.1%) and innovation capabilities (74.8%).

This finding supports the notion that relying solely on ordinary capabilities proves insufficient to ensure high levels of agtech performance, regardless of the specific context in which the agtech operates. Therefore, these results align seamlessly with Proposition 1, further reinforcing the concept that no individual capability, in isolation, possesses the capacity to engender elevated levels of performance in both French and Brazilian NTBFs.

Table 45 – Necessity analysis for French agtechs

Causal Condition	Presence or Absence	Consistency	Coverage
Technological Capabilities (TEC)	TEC	0.740	0.782
	~TEC	0.502	0.608
Marketing Capabilities (MKT)	MKT	0.698	0.763
	~MKT	0.523	0.610
Innovation Capabilities (INN)	INN	0.748	0.735
	~INN	0.500	0.663
Networking Capabilities (NET)	NET	0.617	0.686
	~NET	0.607	0.695
HRM Capabilities (HRM)	HRM	0.761	0.826
	~HRM	0.510	0.599
Organizational Cap. (ORG)	ORG	0.644	0.764
	~ORG	0.590	0.635
Financial Capabilities (FIN)	FIN	0.702	0.773
	~FIN	0.544	0.629
Execution Capabilities (EXC)	EXC	0.621	0.760
	~EXC	0.607	0.635

Source: Research data.
Notes: Outcome variable: Agtech Performance (PERF). The tilde symbol (~) before the causal condition represents the absence of the condition.

In the following section, we present the results of the sufficiency analysis, which sheds light on how agtechs in Brazil and France configure their ordinary capabilities to achieve the desired outcome in terms of agtech performance.

4.3 FSQCA SUFFICIENCY ANALYSIS

The sufficiency analysis, conducted using the fsQCA method, has yielded a significant outcome: it has revealed the existence of diverse configurations of ordinary capabilities that can be equally effective in enhancing agtech performance in both Brazil and France. These findings support Proposition 2, which emphasizes the idea that agtechs do not necessitate the presence of all ordinary capabilities to elevate their performance. Instead, distinct agtechs can leverage unique combinations of ordinary capabilities to achieve comparable levels of performance. These varied configurations shed light on distinct agtech growth strategies, with our research specifically identifying configurations that give rise to three different growth strategies in each country.

The results of the sufficiency analyses conducted in Brazil and France are presented separately in the following sections. We also provide a detailed analysis of the growth strategies underlying these configurations, which were identified using the logical minimization method. Overall, these findings demonstrate the importance of understanding the context-specific growth strategies of agtechs and the diverse ways in which ordinary capabilities can be combined to drive agtech performance.

4.3.1 Brazilian Agtechs: Sufficiency Analysis Results

In accordance with the methodological guidelines established in Section 3, a truth table was generated to conduct our analyses and identify combinations for the fsQCA method. Before proceeding with the truth table analysis, a preliminary adjustment was made based on the frequency and consistency requirements of the fsQCA method. A consistency cutoff of 0.90 and a number-of-cases threshold of 1 were established to ensure the robustness of our results. Additionally, to protect the distinctness of solutions and prevent the same configuration from leading to both an outcome and its negation, two rows of the truth table in which the proportional reduction in inconsistency (PRI) score was lower than 0.50 were eliminated. The truth table (Table 46) was then estimated, and the standard fsQCA analysis was conducted based on this data.

Table 46 – Brazilian agtechs: Truth table for Sufficiency Analysis

TEC	MKT	INN	NET	HRM	ORG	FIN	EXC	PERF	Raw consist.	PRI consist.
0	0	1	0	0	0	0	0	0	0.871	0.509
0	0	1	1	0	0	0	0	1	0.918	0.635
0	1	1	1	1	1	1	1	1	0.917	0.763
1	1	0	1	1	1	1	1	1	0.929	0.791
1	1	1	0	0	1	1	1	1	0.963	0.876
1	1	1	1	1	1	1	1	1	0.946	0.884

Source: Research data.

The sufficiency analysis conducted on a Brazilian sample provided valuable insights into the growth strategies of the agtech industry. The analysis identified four distinct configurations of ordinary capabilities that underlie three different agtech growth strategies, each suited to a specific business context. Importantly, these configurations proved to be equally effective in enhancing agtech performance in their respective contexts.

Configuration 1 (C1) involves the presence of seven out of the eight analyzed ordinary capabilities, including technological, marketing, networking, HRM, organizational, financial, and execution capabilities (TEC * MKT * NET * HRM * ORG * FIN * EXC → PERF). Configuration 2 (C2) is similar to the first but replaces technological capabilities with innovation capabilities (MKT * INN * NET * HRM * ORG * FIN * EXC → PERF). Interestingly, the analysis suggests that technological and innovation capabilities may be interchangeable in certain contexts. The consistency levels achieved by these configurations were very high, with the first and second configurations achieving 93.1% and 94.2%, respectively (see Table 47).

Table 47 – Brazilian Agtechs: Sufficiency Analysis

Intermediate solution	**Raw coverage**	**Unique coverage**	**Consist.**
C1: TEC * MKT * NET * HRM * ORG * FIN * EXC	0.432	0.048	0.931
C2: MKT * INN * NET * HRM * ORG * FIN * EXC	0.440	0.041	0.942
C3: ~TEC * ~MKT * INN * NET * ~HRM * ~ORG * ~FIN * ~EXC	0.202	0.040	0.918
C4: TEC * MKT * INN * ~NET * ~HRM * ORG * FIN * EXC	0.227	0.035	0.963
Frequency cutoff: 1			
Consistency cutoff: 0.917			
Solution coverage: 0.566			
Solution consistency: 0.921			

Source: Research data.
Notes: Outcome variable: Agtech Performance (PERF). The tilde symbol (~) before the causal condition represents the absence of the condition. Model: PER = f(TEC, MKT, INN, NET, HRM, ORG, FIN, EXC). Algorithm: Quine-McCluskey. Cases with greater than 0.5 membership in Configuration 1 (C1): ID043, ID014, and ID044. Cases with greater than 0.5 membership in Configuration 2 (C2): ID044, ID033, and ID043. Case with greater than 0.5 membership in Configuration 3 (C3): ID002. Cases with greater than 0.5 membership in Configuration 4 (C4): ID050.

Configurations 1 and 2 form a group of agtechs that pursue growth through the development of a diverse range of ordinary capabilities. This group is referred to as "resourceful," as all agtechs in this group possess multiple, well-developed capabilities. However, some prioritize a technological capabilities strategy, while others prioritize innovation capabilities to achieve better outcomes. Agtechs in this group that prioritize technological capabilities tend to have high performance and generate good growth rates, given their high endowment of ordinary capabilities, particularly for the development of new technologies. On the other hand, agtechs that prioritize innovation capabilities tend to develop new solutions based on existing technologies, which does not necessarily require a high level of technological capabilities.

Two agtechs that exemplify this group's diverse growth strategies are cases ID014 and ID033. Both have multiple, well-developed capabilities, but ID014's growth strategy is based on the development and commercialization of new technologies for animal feed and nutrition, which requires a greater focus on technological capabilities. In contrast, ID033 focuses on developing new solutions based on existing technologies, such as monitoring pests and diseases in annual crops using satellite imagery and internet of things (IOT) based technologies. This strategy requires greater innovation capabilities to develop these innovative solutions, rather than technological capabilities. Therefore, the agtechs of this group grow based on high endowments of ordinary capabilities, regardless of whether they follow a path aimed at technological or innovation capabilities. Overall, the growth strategy of this group can be represented by a logical minimization of Configuration 1 and 2: MKT * NET * HRM * ORG * FIN * EXC * (TEC + INN) → PERF, where the asterisk represents the Boolean term "AND" and the plus sign represents the Boolean term "OR".

In addition to Configurations 1 and 2, we have also identified Configuration 3 (C3), which constitutes our second group known as ‘outsourcer’. This group primarily focuses on developing two ordinary capabilities, namely innovation and networking capabilities. The primary differentiator of agtechs in this group is their innovation capabilities, which allow them to develop innovative solutions and shape a repeatable, scalable, and profitable business model. However, given the limited availability of other resources and capabilities, agtechs in this group need to develop network capabilities to access resources that they don't possess internally. Thus, the primary challenge for this group is to develop a robust network structure to obtain the necessary resources and make their business viable.

Agtechs in the ‘outsourcer’ group commonly create innovative solutions that do not necessarily rely on high technology. For instance, ID002 provides a marketplace for marketing beef cattle and had to establish a network of zootechnicians, farmers, and software developers to obtain the knowledge and resources necessary to develop and commercialize their solution. Thus, agtechs in this group focus on developing innovation capabilities to continuously create innovative solutions that generate competitive advantages, in addition to networking capabilities to obtain the resources they need to develop and commercialize these innovations (~TEC * ~MKT * INN * NET * ~HRM * ~ORG * ~FIN * ~EXC → PERF). The consistency of this configuration is also very high, reaching 91.8%. By prioritizing innovation and networking capabilities, these agtechs can achieve growth and success even without significant technological capabilities.

Finally, Configuration 4 (C4) represents our third group, also known as "homemade." Agtechs in this group face unique challenges when dealing with scarce capabilities and resources, primarily related to specialized human and networking resources in their high-technology context. Due to the specificity of the technology they pursue, these agtechs must develop specialized knowledge internally, even if it is a time-consuming and expensive process in terms of financial capital. When external acquisition of resources is not feasible, they rely on developing internal capabilities as a growth strategy (TEC * MKT * INN * ~NET * ~HRM * ORG * FIN * EXC → PERF). This configuration displays the highest consistency level at 96.3%.

ID050 is a prime example of Configuration 4 (C4). This agtech has developed an intelligent process to control fermentation in the biofuel, food and beverage, and pharmaceutical industries, requiring specialized knowledge of biotechnology and the internet of things (IOT), among other capabilities. By prioritizing the development of internal capabilities, agtechs in this group can overcome the challenges of scarce resources and achieve growth and success in their respective industries. The ability to rely on their own resources and knowledge allows agtechs in this group to have a greater level of control over their growth and development, as well as the potential to create unique and innovative solutions that set them apart from their competitors.

In summary, the sufficiency analysis conducted on a Brazilian sample has identified three distinct growth strategies pursued by agtechs based on their configurations of ordinary capabilities. The first group, known as "resourceful," includes agtechs with a diverse range of ordinary capabilities, prioritizing either technological or innovation capabilities to achieve their growth goals. The second group, called ‘outsourcer’ focuses on developing innovation and networking capabilities to access specialized knowledge and resources needed to create innovative solutions and develop a profitable business model. The third group, known as "homemade," faces unique challenges related to scarce resources and specialized knowledge requirements due to their high-tech context. They rely on developing internal capabilities as a growth strategy, even if it is time-consuming and costly.

These findings provide valuable insights into the different growth strategies pursued by Brazilian agtechs, emphasizing the importance of understanding and prioritizing relevant ordinary capabilities for optimizing performance and achieving growth in their respective contexts. By identifying these three distinct groups, our analysis offers a roadmap for agtechs to prioritize and develop the capabilities that will enable them to achieve success in their industry.

In the upcoming section, we present the results of the sufficiency analysis for the French sample. To ensure consistency and comparability with the analysis of the Brazilian sample, we followed the same procedures and methodological criteria for this analysis.

4.3.2 French Agtechs: Sufficiency Analysis Results

This section provides a detailed analysis of the agtech industry's growth strategies in the French context by examining the configurations of ordinary capabilities that contribute to improved agtech performance and their relationship with agtech growth strategies. Our analysis builds on our previous findings from the Brazilian context, allowing for a more comprehensive understanding of the agtech industry's dynamics in different geographical contexts.

To analyze a sample of French agtechs, we followed the same methodological criteria established for the Brazilian sample. We set the consistency cutoff at 0.90 and the number-of-cases threshold at 1. We also eliminated one row from the truth table in which the proportional reduction in inconsistency (PRI) score was lower than 0.50 to ensure robust results. Using this refined data, we estimated the truth table for the French sample (Table 48) and conducted a standard fsQCA analysis.

Our sufficiency analysis of the French sample revealed a similar pattern to the Brazilian sample, where a "resourceful" group of agtechs was identified based on the configurations of ordinary capabilities (see Table 49). This group is formed by Configuration B (CB) and Configuration C (CC), which prioritize seven out of the eight ordinary capabilities analyzed, as observed in Brazil. However, there are some differences in the composition of these configurations in the French context.

Table 48 – French agtechs: Truth table for Sufficiency Analysis

TEC	MKT	INN	NET	HRM	ORG	FIN	EXC	PER	Raw consist.	PRI consist.
0	0	0	0	0	0	0	0	0	0.794	0.530
0	0	1	1	0	0	0	1	0	0.872	0.567
1	1	1	1	0	0	0	1	0	0.836	0.569
0	0	0	0	1	1	1	1	1	0.926	0.780
1	0	1	1	1	1	0	1	1	0.924	0.785
1	1	0	0	1	0	1	0	1	0.935	0.817
0	1	1	1	1	1	1	1	1	0.948	0.858
0	1	0	0	0	1	0	1	1	0.972	0.899
1	1	1	1	1	1	1	1	1	0.971	0.946
1	1	0	0	1	1	1	0	1	0.988	0.965
1	1	1	0	1	1	1	1	1	0.984	0.965

Source: Research data.

Table 49 – French agtechs: Standard analysis

Intermediate solution	Raw coverage	Unique coverage	Consistency
CA: TEC * MKT * ~INN * ~NET * HRM * FIN * ~EXC	0.256	0.050	0.941
CB: TEC * MKT * INN * HRM * ORG * FIN * EXC	0.389	0.025	0.974
CC: MKT * INN * NET * HRM * ORG * FIN * EXC	0.357	0.013	0.948
CD: ~TEC * MKT * ~INN * ~NET * ~HRM * ORG * ~FIN * EXC	0.212	0.041	0.972
CE: ~TEC * ~MKT * ~INN * ~NET * HRM * ORG * FIN * EXC	0.200	0.013	0.926
CF: TEC *~MKT * INN * NET * HRM * ORG * ~FIN * EXC	0.214	0.022	0.924
Frequency cutoff: 1			
Consistency cutoff: 0.924			
Solution coverage: 0.546			
Solution consistency: 0.898			

Source: Research data.
Notes: Outcome variable: Agtech Performance (PERF). The tilde symbol (~) before the causal condition represents the absence of the condition. Model: PER = f(TEC, MKT, INN, NET, HRM, ORG, FIN, EXC). Algorithm: Quine-McCluskey. Cases with greater than 0.5 membership in Configuration A (CA): ID076 and ID098. Cases with greater than 0.5 membership in Configuration B (CB): ID106, ID104, ID061, ID077, and ID092. Cases with greater than 0.5 membership in Configuration C (CC): ID106, ID061, ID077, ID099, and ID084. Case with greater than 0.5 membership in Configuration D (CD): ID082. Case with greater than 0.5 membership in Configuration E (CE): ID079. Case with greater than 0.5 membership in Configuration F (CF): ID065.

Configuration B includes technological, marketing, innovation, HRM, organizational, financial, and execution capabilities (TEC * MKT * INN * HRM * ORG *

FIN * EXC → PERF). Configuration C is similar to Configuration B, but technological capabilities are replaced by network capabilities (MKT * INN * NET * HRM * ORG * FIN * EXC → PERF). Interestingly, our analysis indicates that in the French context, agtechs without strong technological capabilities need to rely on well-developed network capabilities to access the specialized technological knowledge they lack. Both configurations exhibit high consistency levels, with Configuration B and C reaching 97.4% and 94.8%, respectively.

To illustrate Configurations B and C, we can examine two examples: ID104 and ID099. ID104 created a unique machine that dispenses fine wines from capsules, allowing for small portions of wine to be served in restaurants and hotels while maintaining the ideal properties of bottled wine. This innovative solution was made possible by the agtech's existing internal technological capabilities, which were sufficient for its development and commercialization.

In contrast, ID099 had to rely on a network of key actors, including scientists, research structures, technical and training institutes, to develop their innovative solutions. This required the company to prioritize the development of networking capabilities to bring these teams together and provide specialized knowledge, compensating for the technological capabilities that were lacking in this context.

Thus, the growth strategy of this group can be represented by a formula that minimizes Configuration B and C: MKT * INN * HRM * ORG * FIN * EXC * (TEC + NET) → PERF. This formula demonstrates that high levels of agtech performance can be achieved through the optimal combination of marketing, innovation, human resources management, organizational, financial, and execution capabilities, along with either technological or networking capabilities. By finding the right balance between these factors, these agtechs can maximize their potential for success.

We have identified a second group, comprising Configurations D and E, which achieved 97.2% and 92.6% consistency levels, respectively. We refer to this group as "top performers" because, unlike the "resourceful" group, they lack strong technological and innovation capabilities, as well as developed network capabilities to overcome deficiencies in specialized knowledge. However, they compensate for these deficiencies with well-developed organizational and execution capabilities, making them good performers in operational terms.

The Configuration D agtechs (~TEC * MKT * ~INN * ~NET * ~HRM * ORG * ~FIN * EXC → PERF) are noteworthy for their focus on marketing capabilities to compensate for the lack of financial and HRM capabilities. In contrast, Configuration E agtechs (~TEC * ~MKT * ~INN * ~NET * HRM * ORG * FIN * EXC → PERF) have high financial and HRM capabilities that complement their weak marketing capabilities. This evidence suggests that strong marketing capabilities can compensate for deficiencies caused by the lack of financial and HRM capabilities, and vice versa. For example, Configuration D agtechs can generate greater sales volume to improve cash flow and overcome the difficulty of attracting investments to finance business growth.

The growth strategy of this group emphasizes organizational and execution capabilities and can be represented as a logical minimization of Configurations D and E: ORG * EXC * ~TEC * ~INN * ~NET * ([~FIN * MKT * ~HRM] + [FIN * ~MKT * HRM]) → PERF. One example of Configuration D is ID082, which developed a business management software for wineries and liquor merchants and producers. Their high growth is not based on a cutting-edge technological development or innovation, but rather on strong sales capacity and good organizational and execution capabilities. In contrast, ID079, which converts algae and microalgae into sustainable food, compensates for weak marketing capability with strong financial and HRM capabilities. This is evidenced by their successful fundraising of over 13 million Euros in 2023 to accelerate hiring and business growth (to preserve the anonymity of the firm, we have chosen not to disclose the source of this information).

The last group, referred to as "high-tech", consists of agtechs that use Configurations A and F. This group excels in attracting and retaining talented individuals, particularly those with advanced technological knowledge, due to their well-developed technological and HRM capabilities. However, there are differences between Configurations A and F. Configuration A agtechs (TEC * MKT * ~INN * ~NET * HRM * FIN * ~EXC → PERF) have strong marketing and financial capabilities to offset their lack of innovation and execution capabilities. However, they suffer from low networking capabilities, hindering their ability to access external resources. Despite these limitations, agtechs can still achieve growth by combining their financial and marketing capabilities with their technological and human resources capabilities.

In contrast, when high-tech agtechs lack financial and marketing capabilities, as in Configuration F agtechs (TEC * ~MKT * INN * NET * HRM * ORG * ~FIN * EXC → PERF), they must rely on network capabilities to access external resources and innovation capabilities to co-develop solutions using their technological knowledge. Organizational and execution capabilities are also critical for Configuration F agtechs to overcome negative impacts on cash flow caused by the lack of financial resources (e.g., difficulty attracting new investments) and marketing capabilities (e.g., difficulty scaling up sales volume). Both Configurations A (94.1%) and F (92.4%) reached high levels of consistency.

For example, ID098 is a Configuration A agtech that specializes in plant-based cell therapy manufacturing. Using their financial capabilities, they raised $10.5 million to build a new production facility and hire scientific and technical staff, which will increase their marketing, technological, and HRM capabilities, leading to better business performance. This demonstrates how a combination of technological, HRM, financial, and marketing capabilities can generate better outcomes.

Therefore, the high-tech group of agtechs relies on a combination of technological and human resources capabilities, along with either marketing and financial capabilities or networking, innovation, execution, and organizational capabilities, to achieve growth. The optimal combination of these capabilities depends on the specific strengths and weaknesses of each agtech. The growth strategy of this group can be represented by a logical minimization of Configurations A and F: TEC * HRM * ([MKT * FIN * ~INN * ~NET * ~EXC] + [~MKT * ~FIN * INN * NET * EXC * ORG]) → PERF.

In summary, the sufficiency analysis of the French sample revealed that agtechs in France can achieve high levels of business performance using six different configurations of ordinary capabilities, which highlight three distinct growth strategies: the "resourceful" group, the "top performer" group, and the "high-tech" group. The resourceful group combines a handful of well-developed ordinary capabilities, including technological or networking capabilities, along with six other ordinary capabilities, making them self-sufficient and less dependent on external resources. The top performer group compensates for their lack of technological, innovation, and networking capabilities with well-developed organizational and execution capabilities, making them good performers in operational terms. To ensure good performance, they also need to have well-developed financial and HRM capabilities or marketing capabilities. The high-tech group primarily has well-developed technological and HRM capabilities, and they rely on either marketing and financial capabilities or networking, innovation, execution, and organizational capabilities to achieve high performance.

The analysis of the Brazilian and French samples revealed that agtechs do not need to have all eight ordinary capabilities well-developed to perform well and grow.

Instead, agtechs can achieve high levels of performance by optimizing the configuration of their capabilities based on their specific strengths and weaknesses, as well as the context in which they operate. By leveraging their core capabilities and compensating for their weaknesses, agtechs can secure high levels of performance and ultimately achieve growth. Thus, this study highlights the importance of a strategic approach to capability development in the agtech industry, as it allows agtechs to focus on their core strengths and maximize their potential for success.

In the next section, we will examine how these results relate to the current literature on the strategic management of new technology-based firms (NTBFs), with a specific focus on agtechs. We will discuss how our findings contribute to, expand upon, and challenge existing literature in this field. By doing so, we hope to provide a deeper understanding of how agtechs can strategically manage their capabilities to achieve high levels of performance and growth.

5 DISCUSSION

In this section, we demonstrate how our research findings effectively address the fundamental issue underlying the question: "How do universities and research centers (URCs) support the development of ordinary capabilities in new technology-based firms (NTBFs) through various knowledge transfer processes, and how do these resources contribute to improved business performance?" Furthermore, we emphasize the significance of our discoveries in contributing to the strategic management research field, particularly concerning knowledge transfer from URCs to NTBFs for capability development and the subsequent translation of this process into superior business performance levels. To improve the organization and discussion of our findings, we have divided the primary research question into three complementary topics that facilitate in knowledge construction and address the proposed research issue.

In the first topic, we illustrate how agtechs that deeply engage in knowledge transfer from URCs, utilizing specific mechanisms, effectively develop select ordinary capabilities, which ultimately enable them to perform better. Additionally, we disclose that the effectiveness of knowledge transfer channels is contingent upon the context in which URCs and NTBFs operate. Notably, in Brazil and France, we identify distinct sets of knowledge transfer channels that are most effective in each respective context, thereby lending support to Proposition 3. We examine the implications of this phenomenon through the lens of the Knowledge Spillover Theory of Entrepreneurship (KSTE) (see JIANG; MURMANN, 2022; MINOLA; HAHN; CASSIA, 2021).

In the second topic, we tackle a prevalent misunderstanding suggesting that a single resource (e.g., a specific ordinary capability) in isolation can significantly enhance NTBF performance (FENG; MORGAN; REGO, 2017). This misconception often emerges among researchers adopting the Resource-Based View (RBV), focusing exclusively on the impact of particular resources on firm outcomes (BARBERO; CASILLAS; FELDMAN, 2011; CLARYSSE; BRUNEEL; WRIGHT, 2011). Our findings indicate that, irrespective of a resource or capability being valuable, rare, inimitable, and non-substitutable, it might be insufficient in isolation to boost NTBF performance (AHMADI; O'CASS, 2018; OLIVA et al., 2019; SAVARESE; ORSI; BELUSSI, 2016). Recognizing that an organization is a bundle of resources (BARNEY, 1991), we assert in this topic that the success of an NTBF's operational activities and, ultimately, its business performance, rely on a combination of ordinary capabilities rather than a single capability. These findings support Proposition 1.

In the final topic, we build upon the preceding discussion by emphasizing a critical aspect: while it's evident that NTBF performance relies on a multitude of ordinary capabilities, as noted by previous research (GARCÍA-CABRERA; GARCÍA-SOTO; OLIVARES-MESA, 2019; PIASKOWSKA; TIPPMANN; MONAGHAN, 2021), we contend that these sets of capabilities are not easily transferable across diverse contexts. The influence of the specific environment in which knowledge transfer and entrepreneurial activities take place is substantial (KETATA; SOFKA; GRIMPE, 2015; PRIEM; BUTTLER, 2001), and it's reasonable to anticipate that the same combination of ordinary capabilities operating effectively in one context may not yield comparable results in another (BARBERO; CASILLAS; FELDMAN, 2011; DOBBS; HAMILTON, 2007). Hence, within this section, we delve into the distinct configurations of ordinary capabilities that emerged in each context, corroborating Proposition 2. Furthermore, we highlight the disparities we observed in our findings concerning the French and Brazilian contexts and engage in a comprehensive discussion of the implications stemming from these observations.

5.1 ENHANCING ORDINARY CAPABILITIES THROUGH URC KNOWLEDGE: IDENTIFYING APPROPRIATE MECHANISMS TO OVERCOME KNOWLEDGE ECOSYSTEM CHALLENGES

Do agtechs that rely heavily on knowledge transfer from URCs to acquire specialized knowledge have better-developed capabilities? What are the most effective knowledge transfer channels for promoting the development of capabilities in agtechs in Brazil and France? The answers to these questions are complex and cannot be simplified to a mere 'yes' or 'no.' Firstly, high-performing agtechs tend to be less dependent on URCs for knowledge acquisition than originally anticipated. Entrepreneurs in both Brazil and France seem to indicate that URCs are not their primary source of specialized knowledge, although there are noticeable differences between the two groups. Despite the limited utilization of URC knowledge transfer mechanisms in both contexts, we found evidence that agtechs which heavily rely on certain mechanisms tend to develop specific types of ordinary capabilities more effectively, especially in the areas of technology and innovation.

Secondly, our research underscores that knowledge transfer from URCs to NTBFs is indeed multifaceted and can occur through various methods, leading to diverse outcomes dependent on the context of the involved parties. As a result, in analyzing this phenomenon, we consider the presence of multiple channels for transferring knowledge from URCs. These knowledge transfer channels (KTCs) act as 'mechanisms' or 'conduits' for knowledge to flow between the engaged parties.

Thirdly, our findings reveal that these mechanisms operate differently in each context, leading to varying levels of results and effectiveness. Consequently, to ensure effective knowledge transfer and achieve the desired outcome (the development of ordinary capabilities in NTBFs), URC and NTBF managers must utilize different mechanisms depending on their context. For example, French agtechs seem to excel in transferring knowledge from URCs through services and consultancies, joint R&D, researchers in companies, public-private networks, and human resources training. On the other hand, Brazilian agtechs appear to have greater success in transferring knowledge from URCs through human resources training and NTBF development programs.

Finally, our findings suggest that the discrepancies in the effectiveness of knowledge transfer mechanisms in Brazil and France can largely be attributed to the maturity of their respective knowledge ecosystems and the state of URC-industry relations within each context. In more mature knowledge ecosystems, the disparities in institutional logic are less pronounced, facilitating a more robust transfer of knowledge from URCs to NTBFs. This difference in ecosystem maturity stems in part from the delayed implementation of public policies in Brazil that would support and foster URC-industry relationships. Globally, the U.S. pioneered this initiative, marking the first wave, swiftly followed by European countries in the second wave. Brazil, meanwhile, is part of the third wave of this global movement (DALMARCO; HULSINK; BLOIS, 2018).

In the following sections, we present a comprehensive analysis of the knowledge transfer mechanisms and their potential to assist the development of specific ordinary capabilities in agtechs. Additionally, we will discuss the inefficiency of certain channels in specific contexts, providing a deeper understanding of their limitations.

Services and consultancies (KTC01)

Regarding KTC01 - Services and Consultancies, our findings reveal that both French and Brazilian agtech firms exhibit limited usage of this knowledge transfer mechanism. Notably, in France, this KTC is among the two least employed mechanisms. This result, however, is not entirely surprising. Although such activities are considered vital for generating enhanced academic and commercial benefits (FRANZONI; LISSONI, 2006), services and consultancies within URCs contribute to merely around 10% of the total revenue generated through technology transfer processes in UK URCs (HESA, 2023; SENGUPTA; RAY, 2017), as an example. Moreover, evidence suggests that services and consultancies are even less prevalent among highly research-intensive URCs (ZHOU; TANG, 2020), such as those in the agtech sector.

Despite the similarities in the usage of these knowledge transfer mechanisms between Brazil and France, the impact on the development of NTBF capabilities differs in each context. In the Brazilian scenario, our research indicates that knowledge transfer through URC services and consultancies does not significantly influence ordinary capacity development. In contrast, in the French context, we observe that agtech firms utilizing this mechanism more extensively tend to develop superior HRM, financial, and network capabilities. This finding implies that French agtech companies engage in URC services and consultancies to address their needs in terms of business management capabilities (HRM and finance) and to enhance their network capacity.

This outcome is understandable, considering that the majority of agtech managers (71% of our French sample) lack formal training and, consequently, the necessary skills in this domain. Generally, agtech managers possess educational backgrounds in technical fields related to the core competencies of the business, such as agronomy, chemistry, biochemistry, engineering, and so on. As a result, French agtech companies tend to engage services and consultancies from URCs to compensate for skill and competence gaps in their managers' educational backgrounds.

The ineffectiveness of this KTC for capability development in the Brazilian context can be partially attributed to the existing gap between academia and practitioners, which leads to researchers not fully understanding market dynamics and, ultimately, providing less effective services and consultancies. As evidence of this disconnect, Atkinson and Blanpied (2008) found that in the United States, only a small fraction of universities (fewer than 100) produce technologies actively used by businesses, and, in less developed countries (such as India, Brazil, etc.), this gap between academia and industry is likely even more pronounced due to the lack of an ecosystem that encourages collaboration between academics and business managers (SHARMA, 2022). As a result, the ineffectiveness of services and consultancies in Brazil can be partially explained by the distance between academic and practitioner domains, stemming from the absence of an ecosystem that promotes and facilitates interactions between these stakeholders.

Consequently, our position is not to argue against the effectiveness of services and consultancies as a mechanism for transferring knowledge from URCs. Instead, we maintain that this mechanism serves as a valuable means for agtech firms to acquire specialized knowledge (albeit to a lesser extent) and can aid in the development of capabilities within these firms. This potential, however, is contingent upon the presence of a well-developed ecosystem that supports such interactions, which is typically more pronounced in advanced contexts.

Joint R&D (KTC02)

Our findings indicate that Joint R&D ranks as the second most prevalent mechanism employed by agtechs for knowledge transfer from URCs in both France and Brazil (see Figure *16*). In fact, Joint R&D has demonstrated its effectiveness as a conduit for smaller enterprises and those with limited resources, such as NTBFs. This method of knowledge transfer enables cost and risk sharing between URCs and NTBFs, allowing resource-constrained firms to create innovative solutions (ALEXANDRE et al., 2022; SPANOS, 2021). Moreover, Joint R&D provides NTBFs with access to external technology sources that would be challenging to obtain using only their internal resources (ARRANZ; FERNANDEZ DE ARROYABE, 2008). Consequently, Joint R&D has emerged as a catalyst for enhancing performance and generating competitive advantages, thereby justifying its widespread adoption among Brazilian and French agtechs (FACCIN et al., 2019).

Despite Joint R&D being one of the most utilized Knowledge Transfer Channels (KTCs) in Brazil and France, we discovered notable disparities concerning the effectiveness of this mechanism in promoting the development of agtech capabilities.

In the case of French agtechs, we observed that those employing this knowledge transfer mechanism more frequently exhibit more advanced technological and Human Resource Management (HRM) capabilities. Conversely, in Brazil, we did not identify significant differences between agtechs that use this KTC more extensively and those that use it less. This discrepancy in effectiveness can primarily be ascribed to two main factors.

First, the success of Joint R&D projects is heavily reliant on the absorptive capacity of the NTBF, which refers to the ability to identify, interpret, and exploit knowledge from other actors (e.g., URCs, suppliers, customers, etc.) (COHEN; LEVINTHAL, 1990). However, the absorptive capacity of NTBFs largely hinges on a team of experienced collaborators with a high level of education, which may present a greater challenge for Brazilian agtechs. When compared to their French counterparts, Brazilian agtechs face more significant financial constraints that limit their capacity to hire qualified human resources (ALEXANDRE et al., 2022).

Second, in 1999, France introduced the Innovation and Research Law (French Law No. 99,587, of July 12, 1999), which institutionalized formal collaboration between URCs and companies, eliminating legal barriers hindering these collaborative initiatives. For instance, prior to the enactment of this legislation, researchers from public universities were considered public servants and, as a result, were prohibited from conducting research or offering services to the private sector. Brazil followed suit with the Marco Legal da Inovação (Brazilian Law No. 13,243, of January 11, 2016); however, this change was implemented in 2016, rendering the movement still relatively nascent in the country. These two factors account for the diminished efficiency of Joint R&D in the Brazilian context.

Joint Publications (KTC03)

Joint publications (KTC03) between URCs and industry partners serve as crucial indicators of the seamless flow of scientific knowledge across academic and business sectors. Moreover, the quantity of joint URC-industry publications not only highlights the occurrence and success of research collaborations between academic and business realms, but also provides a measure of the productivity and intensity of these relationships (TIJSSEN; WONG, 2016). Such interorganizational partnerships between researchers and practitioners are often considered critical links within knowledge ecosystems, with institutional factors significantly influencing these interactions (BOSCHMA, 2005; TIJSSEN, 2012).

However, our study indicates that joint publications are the least employed mechanism for URCs' knowledge transfer among Brazilian agtechs and similarly occupy a low position among French agtechs. Agtechs that lean more heavily on this mode of knowledge transfer showed no notable differences in the development of ordinary capabilities when compared to those that utilize it less, in both Brazil and France. This finding suggests that although joint publications have proven effective for knowledge transfer in various contexts, they may not be the most appropriate method within the agtech sector. Three primary reasons can justify this discrepancy concerning the effectiveness of joint publications for knowledge transfer in the context of agtechs.

Firstly, despite the global annual production of thousands of joint publications, the distribution of this trend is uneven worldwide. The per capita number of joint URC-industry publications in the European Union is approximately half that of the United States and a third less than in Japan (TIJSSEN, 2012). In Brazil, joint publications have seen an average annual growth of 14% over the past 30 years; however, this phenomenon remains in its early stages. The proportion of Brazilian URC publications involving the private sector, relative to the total number of publications, is about half of that observed in the United States. Moreover, a disproportionate 72% of Brazilian joint publications are concentrated within just 10% of the country's universities (CRUZ, 2019).

Secondly, recent studies suggest that joint publications, as a knowledge transfer mechanism, can have a positive influence on technological advancement in small tech-based firms, although this impact takes about two years to manifest. This delay is due to the time needed for the anticipated technological advancements from joint publications to materialize following the commencement of the collaboration (FUKUGAWA, 2013; WIRSICH et al., 2016). Before the actual publication, an extensive period of research and development requires a foundational infrastructure of resources from the agtechs (such as personnel and financial capital). Agtechs, due to their inherent limitations, often lack these resources, making the execution of these initiatives and the patience required to yield the expected results challenging, thus potentially rendering joint publications impractical in this context.

Lastly, the effectiveness of joint research between URCs and industry may be compromised by potential divergent objectives between the two entities. URCs typically use research to "discover and educate," while companies aim to "innovate and improve" their operations. URCs aim for wide dissemination of research findings, while the private sector may prefer to maintain a certain level of confidentiality to ensure competitive advantages. Additionally, URCs often perceive the cost of potential research failures as part of the educational process, whereas the industry might see it strictly as a financial burden that could significantly impact business outcomes (CRUZ, 2019). These factors collectively elucidate why the transfer of URC knowledge via joint publications might prove to be less effective in the context of agtechs.

Student Placement (KTC04)

Regarding Student Placement (KTC04), our findings indicate that in both Brazil and France, hiring students from URCs does not effectively bolster the ordinary capabilities of agtech firms. This conclusion might seem counterintuitive at first, given that recent studies have shown a substantial portion of the knowledge needed for driving innovation relies on a well-educated workforce (CAPOZZA; DIVELLA, 2019). Furthermore, firms possessing an abundance of qualified human resources are typically more proficient in implementing the necessary changes to their resource base to successfully navigate a rapidly changing environment (AUGIER; TEECE, 2009; GARCÍA-CABRERA; GARCÍA-SOTO; NIEVES, 2021).

Nevertheless, when considering the microfoundations of ordinary capabilities, it becomes evident that their development requires a considerable amount of tacit knowledge, mainly derived from an individual's professional experiences. For instance, innovation capabilities are intrinsically tacit and closely associated with experiential learning and personal experiences (RAJAPATHIRANA; HUI, 2018). The cultivation of networking capabilities is an iterative, context-dependent process, heavily dependent on an individual's experience in interpersonal interactions (MCGRATH; MEDLIN; O'TOOLE, 2019). Consequently, the development of ordinary capabilities in NTBFs relies not only on knowledge gained through formal education but also on the experiential background of team members. As such, academics with limited market knowledge or prior professional experience tend to contribute minimally to the development of ordinary capabilities in NTBFs (LÖFSTEN, 2016). This observation significantly clarifies our findings concerning Student Placement.

Additionally, the performance of highly educated employees from URCs is also influenced by the organizational culture within NTBFs, which is intrinsically connected to the founder's individual choices. Unlike established companies, where organizational culture is firmly established and widely shared, NTBF founding teams determine the organizational aspects, rules, tasks, and roles based on their previous experiences and personal preferences. Highly skilled employees may either align with or disagree with these aspects, directly affecting their operational performance and, subsequently, impacting the development of the firm's ordinary capabilities (MATRICANO, 2020). Therefore, while some agtech firms may consider student placement a cornerstone for team-building, this strategy does not appear to effectively enhance ordinary capabilities.

Researchers in Company (KTC05)

Numerous studies have underscored the effectiveness of the Researchers in Company (KTC05) initiative as a conduit for knowledge transfer between URCs and the industrial sector. This mechanism ensures a continuous exchange of knowledge, skills, and expertise among the parties involved (BEKKERS; BODAS FREITAS, 2008; PERKMANN et al., 2013; WEERASINGHE; DEDUNU, 2020). Existing literature further asserts that this human resource mobility is particularly potent in sectors such as chemistry, biotechnology, engineering, and information technology (BEKKERS; BODAS FREITAS, 2008) – all intricately connected to agtechs. However, when examining the development of ordinary capabilities within agtechs, our results uncover certain unique characteristics.

In the context of Brazilian agtechs, we discovered that the use of this knowledge transfer mechanism did not generate significant impacts on the development of ordinary capabilities. The Brazilian agtechs that most frequently utilized this mechanism demonstrated comparable levels of growth across all analyzed capabilities, relative to their peers. In contrast, our study of French agtechs revealed that those hiring URC researchers more frequently exhibited enhanced HRM and financial capabilities.

Brazilian agtechs seem to derive fewer benefits from hiring URC researchers, possibly due to the relatively recent establishment of interactions between academic institutions and the industry in the country. Brazil enacted legislation governing knowledge transfer processes in 2016, significantly later than France, which passed similar legislation in 1999. Consequently, it's plausible that Brazilian researchers have less experience in these URC-industry relationships, directly influencing the result of knowledge transfer efforts. Researchers with more extensive experience in URC-industry relations, a higher number of patents, and stronger entrepreneurial skills tend to yield superior results in knowledge transfer processes (BEKKERS; BODAS FREITAS, 2008). Additionally, recent research suggests that in developing countries, where interaction with URCs is lower, the hiring of researchers by the industry tends not to yield significant results (WEERASINGHE; DEDUNU, 2020).

Our findings underscore a notable distinction between French agtechs and their Brazilian counterparts when it comes to the advantages of hiring URC researchers. French agtechs, in particular, appear to derive substantial benefits from such collaborations. They effectively tap into the extensive partnership networks cultivated by these researchers and leverage the resources stemming from these valuable relationships.

For instance, Case 1, a representative example, reaped substantial advantages from the collaborative efforts of the researchers affiliated with their associated research center. Through these connections, they gained access to investment funds and streamlined their interactions with potential investors, as elucidated by the CEO of Case 1:

> "Indeed, our affiliation with INRIA [research center] proved to be extremely beneficial. When we reached the stage of seeking our initial investors, we were already approached by an investment fund that was connected with INRIA and was consequently waiting for us to formulate a project. Moreover, our dialogue with investors was also eased by this pre-existing connection through an investment fund associated with INRIA" (CEO – Case 1, translated from French to English).

Beyond tapping into network resources, French agtechs that more intensively hire URC researchers appear to better develop their HRM capabilities and gain access to human resources within the networks established by URCs. As the CEO of Case 1 remarked, *"On the other hand, sometimes, there are people who apply to both us and INRIA, and then we exchange professional CVs"* (CEO – Case 1, translated from French to English).

Therefore, the effectiveness of hiring researchers from URCs, as a knowledge transfer mechanism, doesn't rely solely on the sector to which it is linked (e.g., engineering, biology, chemistry, etc.), but also on the institutional environment's stimuli and, consequently, the researchers' experience in URC-industry relations. When this combination is effectively realized, the knowledge transfer channel can foster the development of HRM and financial capabilities, enhancing the growth and success of agtechs.

Networks (KTC06)

Many studies have underscored that the creation and dissemination of knowledge are primarily steered by social networks (e.g., PHELPS; HEIDL; WADHWA, 2012; YE; DE MOORTEL; CRISPEELS, 2020). Within these networks, knowledge permeates among participants, who can function either as a knowledge source or a mechanism for its transmission (ZAHEER; BELL, 2005; ZAHEER; GÖZÜBÜYÜK; MILANOV, 2010). Specifically, the networks forged between academics and industry professionals have been acknowledged in various contexts as an integral mechanism, enabling a continuous flow of knowledge transfer between URCs and industry. This dynamic facilitates learning and nurtures the development of diverse capabilities at the firm level (LIN et al., 2009).

However, our investigation uncovers distinct nuances within the agtech sector. Upon examining the impact of social networks as a knowledge transfer mechanism among Brazilian agtechs, we discovered that those organizations utilizing this mechanism more frequently did not exhibit superior ordinary capabilities. On the contrary, Brazilian agtechs forming robust network ties with URCs seemed to possess lower HRM, organizational, financial, and execution capabilities. These outcomes imply a potential shortfall in the capacity of Brazilian URCs to foster ordinary capabilities in agtechs, attributable to two primary factors.

Firstly, as postulated by Sharma (2022), researchers in URCs within developing countries may exhibit reluctance or face barriers to engaging in collaborations with the business sector in the absence of suitable incentives and legal support. In these settings, the prevailing system of rules and incentives often propels URCs to prioritize publishing in prominent international journals and aligning their research with trends observed in developed countries. This focus often diverges from the realities and challenges specific to their local contexts. These constraints potentially lead to missed opportunities for researchers to acquire and develop knowledge and skills pertinent to business management. The disconnect between URCs and the industry in Brazil, resulting from these limitations, was underscored during our interviews:

> “The university is not ready for this. What we have, for example, through University X (fictitious name), is a very strong interaction with the students who are with us, interning and will be hired as full-time employees. So there's that. If you ask each of them, they will say that what happens there [within the URCs] is one thing, and what happens here [in the company] is another” (CEO – Case B, translated from Portuguese to English).

> "I think [the university] played an important role at the beginning of the business in 2017. But today, they don't have any kind of role. If I may say so; they don't. Nowadays, we seek much knowledge from other startups [NTBFs], from investment funds, from those who are much further ahead, at another level of business, so that we can mirror and conceptualize something. But today, we don't have such intense proximity to universities. [...] I sought out the university for an opportunity, which was incubation with University Y (fictitious name). But as soon as the process ended, we distanced ourselves. Occasionally, we participate in some event they request, but it's very superficial" (CEO – Case D, translated from Portuguese to English).

Secondly, as previously discussed, the maturity of relationships between URCs and the industry in Brazil, and consequently, the development of social networks aimed at knowledge transfer, are significantly influenced by the recent prominence of legal provisions that support and stimulate these interactions. J. L. Lin et al. (2009) propose that, especially in emerging economies, government entities must exhibit profound commitment to fostering and steering collaborations between URCs and the industry to ensure technological advancement via knowledge exchange within these networks. Without such commitment, network formation and knowledge transfer effectiveness may be hampered. In this regard, the advanced maturity of French knowledge ecosystems appears to be a decisive factor contributing to the success of social networks as a mechanism for knowledge transfer within the agtech sector in France.

In the French context, our findings suggest that agtechs relying heavily on social networks established with URCs demonstrate stronger technological and HRM capabilities. Thus, despite the informal nature of this knowledge transfer mechanism, French agtechs tap into valuable human and technological resources through social networks. This was corroborated by the CEO of Case 4:

> "Being part of all these networks, thanks to University Z (fictitious name), we attended a global meeting on insects [the sector in which the agtech operates] for the first time in January 2012, at FAO [Food and Agriculture Organization of the United Nations] in Rome. There were scientists who were working with insects and some companies that were starting to think about this, including us [...]" (CEO – Case 4, translated from French to English).

In summary, our research indicates that the efficacy of social networks as a mechanism for knowledge transfer between URCs and agtech firms is contingent upon distinct factors relating to the firm's operational context. To ensure this knowledge flow encourages the development of ordinary capabilities, there needs to be an established system of norms and incentives to regulate and promote these interactions. Additionally, it's crucial to emphasize that the repercussions of this system are not immediately apparent following its implementation. An adequate period of maturation is required for the knowledge ecosystem, a process dependent on consistent efforts from government and public bodies to foster these relationships. The absence of such concerted efforts results in the ineffectiveness of social networks as a knowledge transfer mechanism. Moreover, it's noteworthy that agtech firms reliant on less robust networks risk compromising their performance when attempting to develop capabilities from a network ill-equipped to provide adequate support.

HR Training (KTC07)

Our findings highlight the pivotal role of Human Resource (HR) training as a powerful mechanism for knowledge transfer, yielding positive outcomes in the development of ordinary capabilities across both Brazil and France. Despite a substantial amount of scholarly effort focused on more complex, science-based knowledge transfer methods such as patent exploitation and joint research, these processes form only a minor part of the overall knowledge transfer dynamics within the sphere of URC-industry collaborations (AGRAWAL; HENDERSON, 2002; FERNÁNDEZ-ESQUINAS et al., 2016). Interestingly, HR training emerges as one of the most commonly adopted mechanisms across diverse sectors. Moreover, it plays a central role in disseminating knowledge related to economic and social science disciplines, such as business management, especially within the service sector (BEKKERS; BODAS FREITAS, 2008; MILLER et al., 2016; WEERASINGHE; DEDUNU, 2020).

Within the French context, our research revealed that agtech firms employing more HR training demonstrated superior financial capabilities. This suggests that HR training serves as an effective mechanism for training equips these businesses with the capabilities necessary to optimally capture and utilize crucial financial resources, which are vital for achieving superior business performance and fostering growth. This was corroborated by the CEO of Case 1:

> “In fact, I had a very technological profile and, therefore, I didn't have the necessary knowledge about the entrepreneurial aspect at that time [at the start of the business]. INRIA helped me and I was finally enrolled in a training course [related to business management] via French Tech. Now in Rennes, through Poool [business association], I have been enrolled in much broader courses truly dedicated to entrepreneurship in the sector we work in, especially related to business model themes. This has allowed us to understand who our customer is, what we want to sell, etc., so as to structure our project accordingly. […] So, I believe the success factor was on several levels. It started with having a solid foundation because we originated from INRIA” (CEO – Case 1, translated from French to English).

In Brazil, HR training has similarly been identified as a crucial conduit for knowledge transfer, albeit with distinct impacts on capability development. Specifically, HR training in this environment positively influences the advancement of technological and innovation capabilities. This outcome is corroborated by Fernández-Esquinas et al. (2016), who demonstrated that HR training in less developed ecosystems – typically comprising smaller local firms such as agtechs that are more resource-constrained – can play a particularly significant role in enhancing technological proficiencies.

Hence, our findings support the perspective that universities act as a significant source of tacit knowledge, providing essential training to human resources that underpins the performance and growth of agtech firms. This mechanism holds particular importance for companies operating within the service and low-to-medium tech manufacturing sectors, which are vital components of more peripheral innovation ecosystems (FERNÁNDEZ-ESQUINAS et al., 2016). Moreover, from the perspective of URCs, reinforcing HR training processes could unlock new possibilities for infusing academic research into industrial settings. Further, URCs that invest more intensely in these processes are better equipped to understand the needs of local businesses, thereby adeptly coordinating resources to tackle the challenges that local communities face (ZHOU; TANG, 2020).

NTBF Development (KTC08)

In many countries, URCs are actively promoting intermediary organizations to take on a more proactive role in knowledge transfer and "third mission" activities. These include establishing incubators and Technology Transfer Offices (TTOs) designed to stimulate the growth and development of NTBFs (FINI et al., 2018; KRUGER; STEYN, 2020; SCUOTTO et al., 2020; VILLANI; RASMUSSEN; GRIMALDI, 2017). These intermediary entities serve a vital role in assisting URCs in diffusing potential disagreements and misunderstandings with NTBFs due to inherent differences in culture, institutional structure, regulatory hurdles, and geographical distances (VILLANI; RASMUSSEN; GRIMALDI, 2017). Furthermore, the practices implemented within these entities are instrumental in facilitating knowledge transfer between URCs and NTBFs. This is because these scientific and technological infrastructures offer NTBFs opportunities to access resources crucial for their routine operations and for the advancement of innovation performance (GARCÍA-CABRERA; GARCÍA-SOTO; NIEVES, 2021).

Consistent with this perspective, our study found that in Brazil, agtechs that rely more heavily on NTBF development programs exhibit heightened innovation capabilities. Interestingly, agtechs that frequently utilize this knowledge transfer mechanism do not possess superior technological capabilities compared to their peers. This supports the findings of Sedita et al. (2019), suggesting that NTBFs participating in incubation programs tend to bolster their innovation outcomes. Furthermore, it appears that participation in such programs enhances the positive impact of the NTBFs' existing technological capabilities on their actual innovation performance. This aligns with the research conducted by Dalmarco et al. (2018), which asserts that the business of Brazilian NTBFs primarily depends on technologies developed by the entrepreneurs themselves, leveraging their inherent technological capabilities, rather than patents or licenses acquired from URCs.

In contrast, our analysis within the French context revealed no substantial differences (at a 5% significance level) in ordinary capability development between NTBFs heavily reliant on NTBF development programs and their less dependent counterparts. A closer analysis implies that NTBF development programs, as a vehicle for URC knowledge transfer, may not effectively nurture the development of ordinary capabilities in NTBFs. However, evidence at a 10% significance level indicates that agtech firms that more extensively utilize these mechanisms tend to display more advanced technological capabilities. These findings are backed by insights from several interviews conducted with French agtechs, illustrated by the following quotation from Case 3:

> "We started working very early in collaboration with prestigious universities and research centers, such as INRIA on many occasions since 2013, and with CIRAD. CIRAD, which is an entity like INRIA, but specializes in exotic and tropical crops. We worked with the University of Gembloux in Belgium, in Liège, which is one of the most renowned in Europe for agriculture. We worked with Cornell in the United States, we worked with Columbia, we worked with Israeli academics, we worked with Tunisian researchers, Moroccan researchers on tropical crops. We also worked with Swiss and Austrian researchers. Now, today we are working with many British researchers. And so, very early on, we created this network with these researchers because it legitimized our know-how, it also allowed us to accelerate the development of certain products by working with specialists and acquiring agricultural and agronomic knowledge that we did not have in our company at that time. That was a big step forward" (CMO – Case 3, translated from French to English).

The aptitude of French agtechs to efficiently transfer technological knowledge from URCs via NTBF development programs can largely be attributed to the maturity of the knowledge ecosystems where these businesses emerge. As highlighted by Villani et al. (2017), the primary challenge in technology transfer between URCs and the industry is bridging the gap between their differing institutional logics, often characterized by conflicting rules and norms. Due to these differences, URCs and NTBFs have distinct rules of action, interaction, and interpretation which guide their decision-making. In more mature knowledge ecosystems like those in France and Europe at large (DALMARCO; HULSINK; BLOIS, 2018), these differences are generally less pronounced, facilitating the transfer of technological resources via NTBF development programs.

In summary, our findings on the effectiveness of NTBF development programs as a mechanism for knowledge transfer reveal noticeable disparities between Brazil and France. In Brazil, where knowledge ecosystems are less developed, the technological base provided by universities plays a significant role but is typically insufficient to stimulate research spin-offs (DALMARCO; HULSINK; BLOIS, 2018). In such contexts, NTBF development programs should concentrate on fostering innovation capabilities within agtechs. On the other hand, in more mature ecosystems where URCs contribute significantly to top-tier scientific output, and institutional logic disparities are less noticeable, NTBF development programs can nurture technological capabilities in agtech firms. Therefore, the maturity of the knowledge ecosystems and the institutional environment in which they operate are key determinants of the type of knowledge transferable through these mechanisms.

Closing remarks

Taken together, our findings underscore a significant variation in the effectiveness of the eight URC knowledge transfer channels, depending significantly on the context. While these knowledge transfer mechanisms generate positive outcomes across all settings, their utilization and efficiency are markedly amplified in more advanced knowledge ecosystems. It's apparent from our findings that the institutional structures, which govern both the operational norms and interrelationships within these ecosystems, profoundly influence the performance of each transfer mechanism within its designated setting.

Therefore, agtech firms strategically employ different channels, potentially leading to a range of outcomes in the development of ordinary capabilities, contingent on the distinct parameters of each context. By judiciously activating the relevant mechanisms within each context, our findings indicate that agtechs can access the specialized knowledge provided via URCs, thereby enhancing their ordinary capabilities. In the following section, we examine the relationship between these increased ordinary capabilities and agtech performance. Specifically, we investigate whether these factors, when evaluated individually, can improve NTBF performance.

5.2 UNVEILING THE INTERDEPENDENCE OF ORDINARY CAPABILITIES: MOVING TOWARDS A RESOURCE ORCHESTRATION PERSPECTIVE

After assessing the capacity of each URC knowledge transfer channel to bolster the development of ordinary capabilities in agtech firms, a pressing question emerges: *Is the presence or absence of a single ordinary capability sufficient to ensure high performance levels in agtech firms?* Our findings suggest that none of the eight ordinary capabilities, when examined individually, are adequate to assure superior performance in agtech firms in both Brazil and France. This aligns with recent studies, such as H. Feng et al. (2017), that argue a solitary ordinary capability cannot independently drive NTBF performance.

Even though ordinary capabilities that are valuable, rare, inimitable, and non-substitutable (VRIN) are regarded as vital, our research highlights that these capabilities on their own are not sufficient for NTBFs to conduct operational activities that nurture a lasting competitive advantage. Such advantages are crucial because they pave the way for effective operational results and performance (AHMADI; O'CASS, 2018; OLIVA et al., 2019; SAVARESE; ORSI; BELUSSI, 2016). Given that achieving success entails surmounting challenges associated with a variety of operations that are fundamentally distinct in both their nature and complexity, NTBFs must arm themselves with a range of ordinary capabilities (FISCHER et al., 2021).

In order to create value, these capabilities require rigorous evaluation, seamless integration, strategic combination, and effective exploitation. This presents one of the principal challenges entrepreneurs face in their pursuit of superior performance (SYMEONIDOU; NICOLAOU, 2018). Therefore, it is essential to understand that without a strategically orchestrated combination of valuable and suitable ordinary capabilities, agtech firms may struggle to overcome obstacles and effectively "make things happen".

For instance, financial capabilities are imperative for NTBFs to acquire and leverage financial resources, enabling them to carve out a position in a niche market. However, to expand the business, other capabilities are also required, such as marketing, innovation, and organizational capabilities, each closely intertwined (ZAHRA, 2021). The requirement for a diverse range of capabilities to address the multifaceted challenges NTBFs face simultaneously is further exemplified by the experiences of the manager in Case 3:

> "So the challenge was this. It was to develop products and have sufficient resources to develop these products, as well as enough resources to continue growing and generating revenue until the new products could be approved and marketed. So how did we solve this seemingly complex equation? The first thing is to generate short-term sales with the chemical molecules we already had. Secondly, we have the infrastructure for research and development and for analysis with high-value chemicals, which we use to provide services to third parties. We work for Company X (fictitious name) and we work for other large companies that ask our chemical experts to develop a molecule, define a synthetic route, perform analyses, etc. This way, it is possible to generate a volume of business quickly" (CMO – Case 3, translated from French to English).

However, as emphasized by Symeonidou et al. (2022), new ventures, owing to their inherent limitations in terms of size and novelty, need to acknowledge the potential risk associated with the simultaneous development of multiple capabilities. The intricacies of managing an array of ordinary capabilities concurrently can exacerbate coordination costs across various functions. Moreover, the strategy to nurture multiple capabilities in tandem might hinder these businesses from rapidly achieving economies of scale due to the increased coordination complexity. These coordination challenges appear to be less significant among more experienced entrepreneurs.

Conversely, fostering multiple capabilities can prove beneficial when an interconnectedness exists among these capabilities. In essence, a mutual synergy can be realized from their complementary nature, which means that the efficacy of a given capability is heightened in the presence of another, thus making it advantageous to form cohesive bundles of capabilities (JANSSEN; CASTALDI; ALEXIEV, 2016; MARITAN; LEE, 2017; SYMEONIDOU et al., 2022). Furthermore, having a diverse array of capabilities may empower NTBFs to seize unexpected opportunities and adapt to changes in dynamic environments. This multi-faceted approach potentially offers a safeguard against unpredictable industry shifts and assists firms in pivoting when opportunities present themselves (SYMEONIDOU et al., 2022).

Nonetheless, it's crucial to underscore that our results do not explicitly endorse the development of either a broad or a narrow portfolio of ordinary capabilities. Rather, our findings highlight the necessity for a well-suited alignment between the business growth strategy and the requisite ordinary capabilities to implement it. The pivotal concept here is the harmonious alignment between capabilities and strategic decisions. Agtech firms must first comprehend the context in which they operate, subsequently define their growth strategy, and finally delineate the capabilities that need to be acquired or developed. Indeed, achieving a balance between these organizational factors is a key driver in fostering high performance among NTBFs (GARCÍA-CABRERA; GARCÍA-SOTO; OLIVARES-MESA, 2019; SIRMON; HITT; IRELAND, 2007; SYMEONIDOU; NICOLAOU, 2018).

In the following section, considering the existence of multiple, equally effective agtech growth strategies, we illustrate how various combinations of ordinary capabilities can enhance agtech performance.

5.3 ALIGNING BUSINESS TRAJECTORY, STRATEGIES, AND RESOURCES: HOW DIFFERENT CONFIGURATIONS OF ORDINARY CAPABILITIES ENHANCE AGTECH PERFORMANCE

Having established that the performance of NTBFs in advanced stages is contingent upon multiple, interdependent capabilities – which are subject to different configurations based on the firm's context and growth strategy – an important question emerges: *What are the different configurations of ordinary capabilities that can lead to equal levels of high performance in agtechs in Brazil and France?* Our research reveals four specific configurations in Brazil and six in France, all demonstrating equal effectiveness in fostering high performance levels within agtech firms. These configurations underline three distinct strategic growth patterns within each context.

Our findings are in line with the assumptions of Piaskowska et al. (2021) and Symeonidou and Nicolaou (2018), which assert that growth strategies and patterns are not only varied, but they also vary at different stages of an organization's lifecycle. They argue that growth strategies pursued by firms at diverse development stages pose unique internal challenges, requiring firms to engage in different activities and manage a variety of strategic resources to optimize performance.

For example, Symeonidou et al. (2022) reveal that early-stage firms exhibit enhanced growth when they prioritize the development of a select range of ordinary capabilities, rather than striving to build multiple capabilities concurrently. They argue that the advantageous outcomes of focused capability development for early-stage ventures stem from more efficient learning, lower coordination costs, and greater legitimacy – all of which are beneficial in a context of resource scarcity. Our research contributes to their study by showing that NTBFs at more mature stages, like growth and scale-up stages, necessitate a broader set of ordinary capabilities to overcome the unique growth-related challenges they encounter.

Our findings are in line with the recent shift noted in the literature on the resource-based view (RBV) (see, SIRMON et al., 2011; SYMEONIDOU et al., 2022; SYMEONIDOU; NICOLAOU, 2018). This shift challenges the traditional belief that the mere possession of valuable resources equips NTBFs to attain superior performance levels. While the RBV has successfully highlighted the importance of strategic resources in enhancing organizational performance (e.g., BARNEY, 1991, 1995), it has fallen short in addressing how managers utilize these resources to generate value (SIRMON; HITT; IRELAND, 2007; SYMEONIDOU; NICOLAOU, 2018).

To address this, Sirmon et al. (2011) introduced a resource orchestration framework that proposes a contingency model where firms seek an optimal alignment between the resources acquired and the strategies employed to enhance performance outcomes. This paradigm shift underscores that the key to achieving exceptional performance lies not only in the resources available, but significantly in how firms manage and leverage these resources. As such, aligning valuable resources – such as ordinary capabilities – with business strategy is a crucial managerial task, integral to survival, growth, and superior performance (GARCÍA-CABRERA; GARCÍA-SOTO; OLIVARES-MESA, 2019; SYMEONIDOU et al., 2022; SYMEONIDOU; NICOLAOU, 2018).

Our research also highlights the inherent versatility of ordinary capabilities, demonstrating their diverse applications and synergistic configuration possibilities (NASON; WIKLUND, 2018; PIASKOWSKA; TIPPMANN; MONAGHAN, 2021). This versatility of ordinary capabilities enables firms to reallocate resources productively and tap into promising opportunities, thereby driving firm growth (DESANTOLA; GULATI, 2017; PENROSE, 1959; PIASKOWSKA; TIPPMANN; MONAGHAN, 2021). Furthermore, this versatility leads to lower transaction costs in structuring, bundling, and leveraging ordinary capabilities, providing firms with the flexibility to adjust growth strategies as per changing circumstances (NASON; WIKLUND, 2018). Hence, ordinary capabilities, due to their nature as versatile resources, empower NTBFs to “get more for less”, thereby fostering venture development (FISHER; NEUBERT; BURNELL, 2021).

In the context of Brazil, our study identifies three distinct patterns related to the configuration of the eight essential ordinary capabilities for NTBF performance. The first pattern, termed 'Resourceful,' pertains to firms with a wide array of capabilities, facilitating them to overcome growth barriers more effectively. The other two patterns elucidate how entrepreneurs tackle resource scarcity, either through outsourcing or by building in-house capabilities.

In France, we identified a similar 'Resourceful' pattern that substantially enhances agtech performance. The other two patterns focus on the efficient organization and execution of business processes and achieving high-tech outcomes, respectively. These patterns further illuminate the strategic approaches adopted by firms under diverse conditions and their impact on performance. We further elaborate on these strategic patterns in the following sections.

5.3.1 Strategic Configuration of Capabilities in Brazilian Agtechs

'Resourceful' agtechs

In the configurational analysis for Brazil, Configurations 1 and 2 constitute the 'resourceful' group of agtechs that pursue growth by fostering a diverse range of ordinary capabilities. These agtechs boast multiple, well-developed capabilities and may focus on either technological or innovation capabilities to achieve better outcomes. Interestingly, this result implies that these capabilities could be interchangeable in specific contexts. Agtechs in this group that emphasize technological capabilities generally exhibit high performance, particularly in developing new technologies. In contrast, agtechs prioritizing innovation capabilities often create new solutions based on existing technologies, which may not require extensive technological capabilities.

These findings reinforce the conclusions of previous studies (e.g., JIANG; MURMANN, 2022; TEIXEIRA et al., 2021a) which assert that technological proficiency is not always the primary asset in a NTBF. Furthermore, it does not inherently constitute the foundation of the business, even within agtechs categorized as 'resourceful'. Our investigation emphasizes that the extent of technological capabilities required fluctuates in line with the technological strategy and business model that the firm elects to implement.

Zahra (1996) clarified that firms typically have a strategic decision to make: they can either strive to be technological pioneers or adopt a follower approach. Depending on this critical choice, certain elements, such as the volume of investments dedicated to internal R&D, as well as the emphasis placed on either incremental or radical innovation, are determined. These determinants directly influence the need for a higher or lower level of technological and innovation capabilities (GARCÍA-CABRERA; GARCÍA-SOTO; OLIVARES-MESA, 2019).

Moreover, our results underscore that, particularly in the agtech sector, technological capabilities can be divided into two distinct clusters: those associated with Information and Communication Technologies (ICTs), and those related to the technical-agronomic domain. The importance of these two types of technological capabilities can fluctuate, depending on the business model chosen and the inherent skills of the team. These variations can potentially inspire entrepreneurs to devise custom strategies for each capability category. For instance, agtechs might opt to internally nurture a specific type of capability, while supplementing the other capability through collaborations with partners who provide non-overlapping resources for innovation initiatives (WANG; JIN; ZHOU, 2023). This strategic choice was captured in the statement by the CEO in Case B, who stated:

> "When we discuss the technical area, we always distinguish the technical-agronomic field from the 'tech' field. If you analyze the co-founders of our company, none of us are hardcore coders. I used to code, I have a background in technology, but I've moved away from the black screen. I shifted to the business area... I moved to consulting to build businesses, to build teams... So, I wouldn't be able to keep up, even with the most current frameworks, to code a system, let alone my two partners. So, we hired a software house. From the technical-agronomic perspective, we have a lot of knowledge, a lot of substance. From the standpoint of entrepreneurship, management, process and so on, we also have a pretty solid background. However, from the perspective of information and communication technology, we had to seek expertise from the market" (CEO – Case B, translated from Portuguese to English).

Overall, owing to their ability to coordinate these multifaceted capabilities simultaneously (KLINGEBIEL; RAMMER, 2014), 'resourceful' agtechs are often more adept at adapting to environmental changes, seizing emergent opportunities with enhanced efficiency. Moreover, due to the interdependent nature of ordinary capabilities (MARITAN; LEE, 2017), the development and orchestration of multiple capabilities allow these agtechs to reap benefits that exceed the aggregate advantages of individual capabilities. This synergy gives 'resourceful' agtechs the edge in building stronger competitive advantages compared to their peers, thereby creating potential for achieving superior performance levels.

For instance, the CEO of Case A underscores the importance of his firm's marketing capabilities. These capabilities played a dual role: they were crucial for successfully launching their products into the market, and they contributed significantly to the products' development. The early marketing stages of the products served as a fertile ground for gathering vital market insights, which were channeled to enrich the intelligence of the R&D department. This confluence of marketing and innovation capabilities generated a potent synergy. This strategic orchestration of resources resulted in the production of highly targeted, precision-engineered products, leading, in turn, to a boost in sales effectiveness:

> “I have to respond swiftly to what's wrong [with the product] and co-create with the customer. I had an aggressive guy who made many deals; he sold what we didn't even have yet. We then rushed to either create or adjust an already existing product as needed. If an issue arose, we'd go back and make adjustments. This iterative process helped us evolve. To give you an idea, by the third month, we were already at breakeven (we had reached the business's break-even point). [...] To put it into perspective, 80% of the deals we close come from referrals. It's because our product is really good. It effectively addresses the customer's pain points. […] Today, we have 37 products in the pipeline, including products being registered, which Brazilian law says wouldn't be necessary, but we are anticipating any type of regulatory change. So, we have 37 Temporary Special Registrations, meaning we have a lot of products in progress” (CEO – Case A, translated from Portuguese to English).

Another pivotal factor in the success of 'resourceful' agtechs lies in the intersection of organizational and human resource management (HRM) capabilities. The process of large and rapid growth, an aspiration common to but seldom actualized by NTBFs, demands robust structures, efficient processes, and disciplined management to sustain such rapid growth (PICKEN, 2017). To maintain high performance standards, NTBFs need to adopt a more flexible and organic organizational framework, empowering them to rapidly recalibrate their organization in the face of changes (OLIVA et al., 2019). Moreover, NTBFs must establish a planning and management framework that permits the monitoring of projected outcomes without imposing rigidity on the structure that could potentially stifle innovative processes (YANG; SUN; ZHAO, 2019). The intricacies involved in organizational structuring are elucidated by the CEO of Case B:

> The moment you start structuring teams, you begin to accrue more processes. Consequently, you have to organize these processes. Communication starts to become more challenging. You start to generate more volume, your growth accelerates, but you need to structure this and transition from an emergent strategy to a more deliberate one. Otherwise, the different areas won't complement each other, understand? It's one thing to have 3, 4, 5, or 6 people. You talk to someone else, and they already know what you're doing. But what about when you have 30, 40, 50, or 60 people? How do you coordinate all these efforts? Because you have to coordinate marketing, sales, products... You have to coordinate all aspects of the people side, etc” (CEO – Case B, translated from Portuguese to English).

HRM capabilities, in turn, enable the company to attract and select proficient employees who are vital for business development. When these employees are correctly integrated into the organizational structure, and when they are genuinely committed and engaged with the business outcomes, they contribute to operational results such as innovation, quality, and customer satisfaction. Over time, these factors culminate in financial outcomes like augmented productivity, increased profit, and a higher return on investment (GUEST, 1997; VIITALA; VESALAINEN; UOTILA, 2022).

However, ensuring the anticipated results from hired employees requires more than just their qualifications in terms of experience and education – factors widely recognized in management literature (e.g., JENSEN; LÖÖF; STEPHAN, 2020; LÖFSTEN, 2016; MARVEL; DAVIS; SPROUL, 2016). It's equally important to guarantee a 'cultural fit'. This principle underscores the necessity for employees to resonate with the agile tenets of the 'Lean Startup' culture (BLANK, 2013; HARMS; SCHWERY, 2020; RIES, 2011), wherein search and execution are the two primary activities undertaken by entrepreneurial firms (YANG; SUN; ZHAO, 2019). This requirement emphasizes the distinct differences in the profiles of established companies and NTBFs. Therefore, in addition to technical aptitude, NTBF employees need to demonstrate a strong 'cultural fit', as underscored by the CEO of Case A:

> “We were having personnel issues; the operation was growing significantly. We started with 109 people and today we're at 320. We should finish the year with 400 people. We no longer have a personnel problem. That's been resolved. To give you an idea, we should reach the end of next year with 700 people, because we have to triple in size. [...] When we appointed an experienced chief legal and compliance officer, who had been working with us as a contractor for 2 years, someone who was already familiar with our culture, already knew the business, we hired him and he 'hit the ground running', you know? So it's necessary to have a stock option program to attract this type of collaborator. It's very important! Because they won't come just for the money. They'll come for the big dream and a 'slice of the pie', and you have to be open to having this stock option and bringing in collaborators who 'play well' and who are experienced. So our 'life' changed, because our capacity for scaling and executing increased dramatically with these experienced collaborators who also fit culturally” (CEO – Case A, translated from Portuguese to English).

Lastly, it's crucial to underscore that 'resourceful' agtechs possess robust financial capabilities. These not only facilitate the capture of essential financial resources for business expansion but also structure the utilization of this capital to maximize its impact (BARBERO; CASILLAS; FELDMAN, 2011; ULLAH; ANWAR; KHATTAK, 2021). Additionally, these agtechs are equipped with potent execution capabilities, ensuring planned deliveries (LEE, 2022; YANG; SUN; ZHAO, 2019), and networking capabilities, enabling them to tap into external resources from a diverse range of partners to augment their internal assets (MCGRATH; MEDLIN; O’TOOLE, 2019).

Figure 22 visually represents how different groups of agtechs configure their ordinary capabilities to enhance business performance. Moreover, this figure emphasizes the significance of HR Training and the NTBF Development Programs as mechanisms for URC knowledge transfer that aid in the development of technological and innovation capabilities.

‘Outsourcer’ agtechs

Configuration 3 represents the ‘outsourcer’ group, which primarily focuses on developing innovation and networking capabilities. Although the agtechs in this group possess innovation capabilities that enable them to create innovative solutions, they face limited availability of other capabilities. As a result, these agtechs need to develop strong networking capabilities to access resources they don't possess internally. Consequently, agtechs in this group emphasize the development of innovation capabilities for generating continuous innovative solutions and competitive advantages, alongside networking capabilities to secure necessary resources for developing and commercializing their innovations. By prioritizing both innovation and networking capabilities, these agtechs can achieve growth and success without substantial technological capabilities, for example.

As highlighted by Symeonidou et al. (2022), the practice of business process outsourcing has gained widespread acceptance among newer and smaller firms such as NTBFs, providing them with enhanced flexibility in structuring their business models. NTBFs have the option to internally organize business functions, or they can outsource specific activities to third parties (NASON et al., 2019). Greater capability outsourcing – as exemplified by 'outsourcer' agtechs – can enable NTBFs to specialize in select activities or processes, thereby attaining recognition and legitimacy for their unique strengths. However, such a strategic decision could potentially make agtechs more susceptible to external dependencies, thereby adversely affecting their capacity to derive value from their operations (SYMEONIDOU et al., 2022). Thus, the decision to develop a broad or narrow scope of ordinary capabilities is inherently a strategic choice for the firm.

For instance, the agtech represented by Case B in our study employed its networking capabilities to obtain technological knowledge that could enhance their R&D process, as well as to obtain market resources and insights for testing the pilot version of its platform. According to its CEO, these networks were activated differently in various stages of the business lifecycle, each requiring distinct types and degrees of knowledge. However, irrespective of the phase differences, outsourcing particular processes or activities consistently emerged as a strategic measure to circumvent the challenges associated with resource scarcity. The CEO of the firm elucidated this strategy as follows:

> "So I think networking also had a significant impact. For example, we managed to access external data in the first year of our MVP. So, the networking happened on both sides: I was more on the business side and my partner was more into data, research, etc. [...] Networking was very crucial, and also for running our pilots. [...] In the beginning, everything was internal, everything with us. So we started to seek external information, through references, texts, studies, models, other complex systems etc. Afterward, we began to bring in people to help us, also in a consultative format. [...] And now, we're heading to the stage where we start hiring external knowledge to develop parts of the models and implement them in the tool, you see? Thus, we continue to bring in external knowledge, but the demand for knowledge will start to become more specialized, and so we need to go further. At this moment, in the nutrition area, we are analyzing: either to do an acqui-hiring [a purchase of a startup focused on human resources], or a hiring for a robust project of 2 PhDs in the area of fertility" (CEO – Case B, translated from Portuguese to English).

In summary, despite the intrinsic risks associated with outsourcing processes or activities, 'outsourcer' agtechs appear to leverage this alternative as a viable strategy to foster their business growth. The inherent resource scarcity prevalent within NTBFs, compounded by the challenge of operating within a relatively undeveloped knowledge ecosystem, prompts these agtechs that require more substantial resources to pursue them externally. They acknowledge that developing these capabilities internally might be unfeasible given the considerations of operational costs, the high expenditure associated with specialized human resources, and the timeframe required for development.

‘Homemade’ agtechs

Configuration 4 represents the ‘homemade’ agtech group, which faces distinct challenges due to scarce capabilities and other resources, primarily in specialized human and networking resources within their high-technology context. As they pursue specific technologies, these agtechs must nurture specialized knowledge internally. When external resource acquisition is not viable, they depend on developing internal capabilities for growth. While this strategy may be time-consuming, the ability to rely on their own resources and knowledge grants agtechs in this group greater control over their growth and development. Moreover, it offers the potential to create unique, innovative solutions that differentiate them from competitors.

Case D offers a suitable illustration of a 'homemade' agtech. This firm pioneered a platform that bridges the gap between small-scale farmers and large food retailers in Brazil. Its principal objective is to streamline the sale of products, thereby enhancing the revenue generation for smaller producers. To bring this product to life, the firm predominantly relied on their intrinsic capabilities and knowledge. During this period, the firm grappled with limited financial resources, which prevented them from hiring expert workforce or tap into external knowledge sources in a major extent. In addition, they lacked sufficient networking capabilities, which might have enabled them to acquire necessary insights from external partners. In the face of these constraints, the firm chose to rely heavily on its internal capacities to realize their objectives – a strategy underscored by the firm's CEO:

> "I didn't have any software developers, and it was a really cool experience because we managed to develop [the databases]. Developers today look at it and say, 'I don't understand how you reached this level of database structure, because what you've built is impressive.' So, we faced this great difficulty of having to use what we had on hand at that time, which were only our spreadsheets. This later allowed us, when we had a development team, to put all of this into practice [develop the platform]" (CEO – Case D, translated from Portuguese to English).

Indeed, NTBFs typically emerge with a markedly limited network capability. This is not an innate resource inherently possessed by these firms; instead, it's a capability that demands nurturing and development over time. Moreover, due to their absence of established reputation and legitimacy, NTBFs need a longer period to be acknowledged as a credible new player within a particular network of actors (MCGRATH; MEDLIN; O'TOOLE, 2019). These barriers can prevent them from accessing specialized resources available within a network of collaborators. Consequently, these firms often demonstrate a propensity for autonomy, rather than adopting the interdependence commonly cultivated within networks (MCGRATH; MEDLIN; O'TOOLE, 2019; MUELLER; THOMAS, 2001). Thus, in light of their circumstances, 'homemade' agtechs, such as Case D, tend to demonstrate a strong internal locus of control and focus on enhancing their execution capabilities to navigate their inherent limitations. This approach is further elucidated by the CEO of Case D:

> "Today, we don't make mistakes. We're looking at the numbers daily, right? That's also something we learned. It was a mistake; we weren't looking at the numbers daily. Today, I examine the numbers every day, and closely monitoring these figures enables us to make very precise decisions and be even quicker in this process of change. [...] And then there's another thing: execution. It's about planning and executing that plan very well. Having good ideas doesn't help if we don't have excellent execution. So, I believe that these two things would be crucial at this point" (CEO – Case D, translated from Portuguese to English).

Another crucial distinction between 'homemade' agtechs and others is their underdeveloped HRM capabilities. According to Symeonidou and Nicolaou (2018), this deficiency in HRM can result in elevated employee turnover rates, thereby impeding the retention and transfer of tacit knowledge within the firm (HATCH; DYER, 2004). Moreover, these agtechs' insufficient HRM capabilities may hinder their ability to foster strong employee engagement and commitment to the firm's objectives. This, in turn, can negatively impact the firm's productivity and their likelihood of achieving desired outcomes (GEROSKI; MATA; PORTUGAL, 2010). Further, the limited capability to attract highly skilled human capital can undermine the perception of legitimacy in the eyes of venture capitalists, a critical factor for securing investment (BAUM; SILVERMAN, 2004).

However, strengthening HRM capabilities in NTBFs often relies on substantial financial investments, potentially detracting from funding other critical business areas. For instance, attracting top-tier talent necessitates offering more competitive remuneration packages, such as higher salaries or profit-sharing arrangements (see CARLSON; UPTON; SEAMAN, 2006; MARCONATTO et al., 2022b; TODOROVIĆ et al., 2019; WANG; THORNHILL; ZHAO, 2018). Yet, such a financial commitment could be risky for resource poor NTBFs. Similarly, funding educational pursuits or professional qualifications, a common practice among established firms for motivating and retaining employees, might be unaffordable for most NTBFs (SYMEONIDOU; NICOLAOU, 2018). The challenge of attracting and retaining talent is depicted by the CEO of Case D, who states:

> "So, I also believe that the quality of the team depends on our ability to seek out incredible talents to build the business with us. However, we live in a time when ‘tech salaries’ are highly inflated. It's tough to hire a tech team. That's a significant challenge" (CEO – Case D, translated from Portuguese to English).

Therefore, in a context marked by limited financial resources, these agtechs' modest HRM capabilities can be seen as a deliberated strategic choice made to balance necessary investments. A decision to heavily invest in one resource over another could significantly affect their performance and even pose a threat to their survival (SYMEONIDOU; NICOLAOU, 2018). As a result of these challenging circumstances, NTBFs generally seem to offer less competitive compensation packages (OLIVA et al., 2019). This factor further exemplifies the delicate balance these firms must maintain to optimize their limited resources effectively.

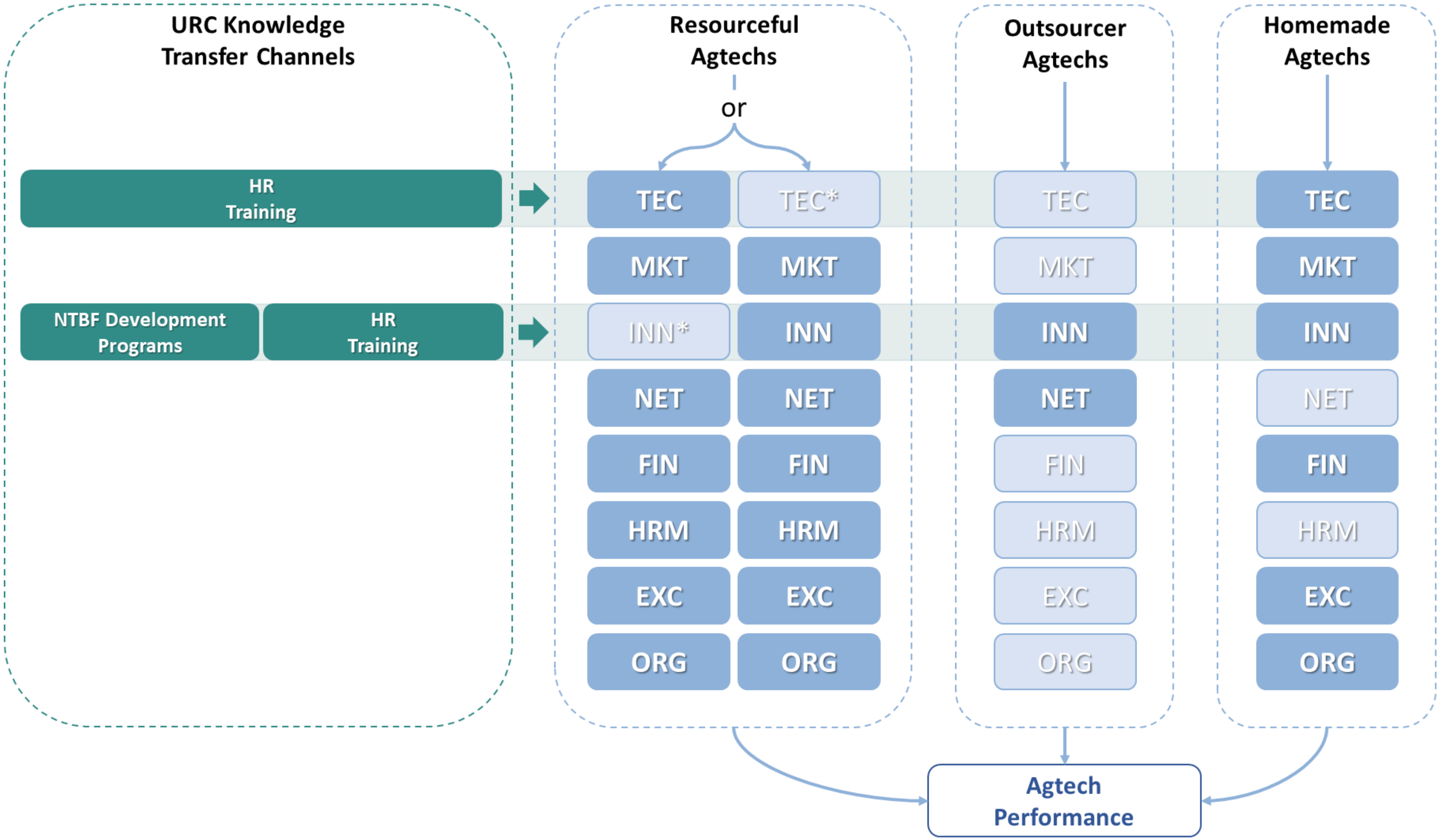
To compensate their shortcomings in HRM capabilities, 'homemade' agtechs appear to strengthen their organizational capabilities to guarantee optimal business structuring. For instance, agtechs must strive to achieve an ideal match between their available team – which constitutes a limited resource – and the various business processes. Additionally, outcomes must be carefully tracked, since any inefficiencies should be swiftly identified to initiate necessary adjustments to the firm's structure. This process is intricate and should be subjected to ongoing review, as underscored by the CEO of Case D:

> "I would say that, in our case, speed is a significant challenge because we need to grow quickly, but also in a structured manner. So, it's about balancing these two aspects, you understand? Speedy growth and structuring are two things that need to go hand in hand, and they're quite complex. And so, we try every day to do it" (CEO – Case D, translated from Portuguese to English).

In summary, 'homemade' agtechs, owing to their shortcomings in networking and HRM capabilities, struggle to access crucial resources from their network of partners as efficiently as 'outsourcer' agtechs. This requires a more intensive internal development process of essential capabilities, which makes the process more time-consuming. On the other hand, 'outsourcer' agtechs, despite being able to decentralize many essential business activities, which can result in economic and time-saving benefits, might find themselves more reliant on partners. This dependence can expose their business to higher risk due to the decentralization of critical aspects that drive competitive advantage.

Finally, 'resourceful' agtechs, with their broader internal pool of ordinary capabilities, tend to navigate challenges more effortlessly. However, this strategy comes at a higher cost and requires substantial financial resources, increasing business risk proportionally. Given the limited availability of capital and greater risk aversion of investors in less favored institutional environments, such as Brazil, business models that demand more resources may appear less attractive for investment contributions. Thus, there's no one-size-fits-all strategy; instead, the best strategy is contingent upon the specific context of the NTBF. Once this strategy is comprehended, managers must then determine the capability set they should develop and configure.

Figure 22 - Strategic Configuration of Ordinary Capabilities in Brazilian Agtechs



Notes: The figure employs blue rectangles to symbolize the ordinary capabilities that have been configured to increase the performance of agtechs. Rectangles with a lighter shade of blue indicate absent conditions, whereas those with a darker shade represent present conditions. The conditions marked with an asterisk could be either absent or present. Abbreviations: TEC = technological capabilities; MKT = marketing capabilities; INN = innovation capabilities; NET = networking capabilities; FIN = financial capabilities; HRM = human resource management capabilities; EXC = execution capabilities; ORG = organizational capabilities.

5.3.2 Strategic Configuration of Capabilities in French Agtechs

‘Resourceful’ agtechs

In our examination of the French data, we detected a group of agtech firms, designated as 'resourceful,' which incorporates Configuration B and Configuration C. These firms present a comprehensive suite of highly developed ordinary capabilities, reflecting a parallel with their 'resourceful' Brazilian counterparts. Notably, French 'resourceful' agtechs exhibit proficiency across all eight ordinary capabilities, except for networking and technological capabilities, which seem to be mutually compensatory in this context. Thus, within the French 'resourceful' agtech landscape, technological shortcomings are counteracted by a greater emphasis on networking capabilities, marking a distinctive deviation from the Brazilian 'resourceful' subset.

Consequently, within the French agtech ecosystem, 'resourceful' firms with limited technological capabilities compensate by capitalizing on their robust networking capabilities to access the specialized technological knowledge they require. This necessitates collaboration with external partners such as scientists or research institutions. Success in the high-tech sectors where many agtechs operate depends not only on the effective development, management, and application of their own resources for strategic advantage but also on their ability to build and coordinate a network of partners and resources (NORDIN et al., 2018; RAMPERSAD; QUESTER; TROSHANI, 2010). Hence, these abilities are closely related to NTBF performance and growth (GARCÍA-CABRERA; GARCÍA-SOTO; NIEVES, 2021)

In high-tech scenarios, due to their complexity, resources and infrastructure are not monopolized by any single organization. Instead, they are dispersed across various actors within the ecosystem (AARIKKA-STENROOS; SANDBERG; LEHTIMÄKI, 2014; NORDIN et al., 2018), which can pose challenges for NTBFs attempting to access these valuable resources.

Nonetheless, in more mature knowledge ecosystems, interactions between URC and industry are likely facilitated by established institutional mechanisms and a more developed network culture (see DALMARCO; HULSINK; BLOIS, 2018; LIN et al., 2009). This ease of access enables French agtechs to readily leverage these resources through partnerships. Hence, these firms should focus on enhancing their networking capabilities to forge robust connections with these external entities, supplementing their specialized knowledge and counterbalancing their technological shortfalls.

A fitting illustration of a 'resourceful' French agtech is provided by Case 4. This firm is currently a global leader in the production of insect-derived protein, offering an organic and sustainable long-term solution to boost protein and plant consumption. Given the complex nature of the necessary resources and the high level of technological innovation required, they had to develop a network of partners. This network not only eased their access to technological know-how but also smoothed the path for introducing their highly disruptive and previously unknown product to the market. Consequently, these networks not only facilitated access to markets and technology but also helped to establish legitimacy for both the product and the firm. The interdependence between technological and networking capabilities is captured in a statement by the CEO of Case 4:

> “And in fact, to better understand, we recruited a sales director who came from the animal feed sector and who really contributed a lot, who structured, who put all his networks and who really structured the entire commercial dynamic and who showed that it wasn't as easy as the FAO said, to simply sell products, no, it's not at all. We had to create a whole commercial approach, more business development than... it's not just sales representation, to create the market in fact, to create demand and it involves a lot of science, again where here, we conducted tons of trials in addition to ANR projects, in research centers and in direct bilateral agreements, so in France on trout, in Norway on salmon, in Greece on sea bass, we did in Thailand on shrimp, we also did in France on chickens, there you go. We have multiplied trials everywhere on dogs and cats too in France and England. Trials, trials conducted by independent laboratories that made control foods without our products or with our products integrated into them, and see the impact it had. And we saw a lot of benefits in terms of the health of the animals, faster growth, better metabolism, and all that. So, we had tons of scientific, technical arguments, well supported by tests, by scientific reports and independent people who carried them out, and which allowed us to go send it, show it to clients to open the door by saying: ‘Look, we've found things, it's not us who are saying this, they conducted trials with scientists with whom you usually work, your customers too. Here, maybe it's worth taking a look’, and that helped to open the door” (CEO – Case 4, translated from French to English).

Finally, our research confirms that varying forms of resources and capabilities, when held by collaborative partners, deliver unique, non-overlapping value to the innovation initiatives of agtech firms (WANG; JIN; ZHOU, 2023). Moreover, our findings are in line with recent research (e.g., GARCÍA-CABRERA; GARCÍA-SOTO; NIEVES, 2021; LINDELÖF; LÖFSTEN, 2002; LÖFSTEN, 2016) that posits the technological intensity of these collaborations may be significantly enhanced when NTBFs engage in network alliances or conduct joint research with URCs. This strengthening arises because the advanced technological and scientific infrastructure of URCs equips NTBFs with critical technical expertise and access to essential network connections. These elements are vital not just for the everyday functioning of the enterprise, but also for boosting the innovation performance in the agtech sector (GARCÍA-CABRERA; GARCÍA-SOTO; NIEVES, 2021).

‘Top performer’ agtechs

The second group of French agtechs, comprising Configurations D and E, is identified as the 'top performer' agtechs. This group, despite its strong performance, has notable weaknesses in technological and innovation capabilities. Unlike the 'resourceful' agtechs, these 'top performers' lack robust network capabilities to compensate for their deficiencies. In response, they concentrate on enhancing their organizational and execution capabilities, which in turn allow them to achieve significant operational results. The CEO of Case 1 emphasizes the essential role of efficiently structuring the business, translating ideas into actionable plans, and following through with their implementation. These elements are key aspects of organizational and execution capabilities (LEE, 2022; YANG; SUN; ZHAO, 2019):

> “And then, there is always this moment when prospects are very interested and we feel there is a possibility to do something with them, but on the other hand, we are not mature enough and we still have an idea and we are not structured to be able to go further commercially with them. So, it was about feeling that right moment when it's too early to do business with you, but if we don't hurry up to create, we will never be able to take the plunge. [...] I've seen a lot in other start-ups that this was also a point that perhaps slowed down development because the founders never forced themselves to take the plunge, meaning it was always an idea, an idea, an idea and then when it really becomes a company, they struggled to get there. So, that might be something we need to look at, yes” (CEO – Case 1, translated from French to English).

Indeed, for agtechs to flourish in dynamic, challenging contexts, they must be proficient in both creating innovative product ideas and executing them effectively, translating them into profitable ventures (KAUL, 2013; LEE, 2022). Additionally, organizational capabilities, pivotal in coordinating resources and synchronizing team efforts, are integral to boosting the performance of 'top performer' agtechs (MISHRA; SINHA; THIRUMALAI, 2017). Nevertheless, this remains a remarkable challenge for many firms. Despite their best efforts to develop strategic plans, more than a third fail to implement them effectively (MANKINS; STEELE, 2005). As a result, the combination of organizational and execution capabilities emerges as a substantial competitive advantage for 'top performer' agtechs (LEE, 2022).

As highlighted by Yang et al. (2019), execution is a pivotal operation in modern organizations, intimately related to their survival and growth. Such execution capabilities equip agtechs with the means to design and implement specific strategies for optimizing resource allocation to meet their goals. Furthermore, robustly developed execution capabilities can endow 'top performer' agtechs with an enhanced market understanding, effectively applying past experiences into daily operations and facilitating more precise predictions. Crucially, the combination of refined execution and organizational capabilities allows agtech firms to strike an optimal fit between human resources and operational processes. This integration paves the way for the design of a comprehensive business plan and its efficient execution, ultimately leading to increased profitability.

However, it's crucial for agtechs not to overfocus on execution and organizational capabilities. NTBFs strive to innovate and market simultaneously, which requires unique capabilities and operational approaches. Often, the complexity of these processes leads to one being accomplished at the expense of the other (LEE, 2022). These challenges resonate with findings by Symeonidou et al. (2022), who argue that early-stage firms, due to inherent liabilities of smallness and newness, should develop business strategies focusing on a narrower set of capabilities to foster efficient learning, reduce coordination costs, and enhance legitimacy.

Additionally, Yang et al. (2019) suggest that focusing on execution capabilities primarily benefits firms older than seven years. For younger firms, an overemphasis on execution may inhibit earnings growth. These findings highlight the need for a balanced approach between creative, innovative initiatives and disciplined structuring and execution across different developmental stages.

Furthermore, to reach high performance, 'top performer' agtechs must incorporate additional capabilities alongside organizational and execution ones. Two potential routes are available: some firms counter deficiencies in financial and HRM capabilities by emphasizing marketing capabilities, implying robust marketing can offset drawbacks from insufficient financial and HRM capabilities. Conversely, agtechs can counterbalance limited marketing capabilities by enhancing financial and HRM capabilities. For instance, some agtechs increase sales volume to boost cash flow and overcome investment attraction challenges, while others compensate for weak marketing capabilities by leveraging strong financial and HRM capabilities to obtain and leverage third-party investments. Case 2 provides a valuable example of how financial and HRM capabilities can effectively compensate for limitations in marketing capabilities:

> "Its ability to recruit talents of all kinds, of all backgrounds, I would say, or, in short, whether they are technical, engineers, sales, legal, etc. So, it's about bringing people together, and that is also something that an investor sees. There are very, very good founders who are extremely brilliant, etc., but who are not unifying and who cannot recruit. That's quite important, so if you can recruit someone who comes to join your idea, normally, it's a good point for selling your product as well. So there you have it, what else is there... It's essentially that which allows growth, at least in our type of company" (CEO – Case 2, translated from French to English).

Indeed, in certain contexts, marketing and financial capabilities can be seen as interchangeable. The robustness of marketing capabilities is evaluated by a firm's adeptness in better identifying, engaging, and serving their respective markets. This level of expertise often leads to enhanced financial results, thereby lessening the reliance on considerable financial assets (HAO; SONG, 2016; KAMBOJ; GOYAL; RAHMAN, 2015). Moreover, sophisticated marketing capabilities empower agtechs to formulate efficient pricing strategies, which are vital for maximizing returns from product innovation (FALAHAT et al., 2020).

Furthermore, while 'top performer' agtechs with limited financial resources may face greater challenges in attracting external investments, such limitations should not hinder their growth. In addition to bolstering their marketing capabilities, these agtech firms can employ successful self-financing strategies, often referred to as bootstrapping, to circumvent traditional financial barriers. As elucidated by Vanacker et al. (2011), among other benefits, bootstrapping strategies can encourage entrepreneurs to improve their cash management skills and seek more innovative paths to growth. Furthermore, the disciplined approach of bootstrapping may compel NTBFs to address and resolve issues that would otherwise remain obscured and unresolved amidst high cash burn rates. This in turn should lead to increased operational efficiency and, ultimately, superior firm performance.

In summary, 'top performer' agtechs distinguish themselves from their counterparts by placing a strong emphasis on their organizational and execution capabilities. However, while this combination generates competitive advantages, these firms must be mindful not to develop a narrow focus on these capabilities, as this could obstruct innovation and the creation of new products. They are also presented with a choice between two distinct pathways: either to nurture robust marketing capabilities or to strengthen their financial and HRM capabilities.

In addition to the points previously mentioned, it's critical to note that agtech firms opting to develop marketing capabilities often receive less support from URCs. This is largely because the knowledge transfer channels provided by URCs are generally less effective in fostering marketing capabilities. Conversely, as demonstrated in Figure 23, 'top performer' agtechs that choose to amplify their financial and HRM capabilities can leverage five URC knowledge transfer mechanisms. This strategic decision can make their trajectory less challenging compared to those who chose a different path.

'High-tech' agtechs

The third group, labeled as "high-tech," comprises agtechs in Configurations A and F. The agtechs in this group structure their business model around the creation of innovative products based on cutting-edge technologies, which primarily necessitates the development of technological capabilities rooted in advanced scientific knowledge. Cases 3 and 5 provide fitting representations of 'high-tech' agtechs:

> "And then the second reason is that, as I was telling you, about a third of the teams are scientists working in R&D. We have 20% of PhDs in the team. We are 185 in total, so 20% PhDs, as you can see, that's a lot. We have innovative scientists across all sectors - chemists, physical chemists, biologists, botanists, entomologists, agronomists, industrial engineers - really scientists from all backgrounds. Each one complements the others and brings intelligence and innovation" (CMO – Case 3, translated from French to English).

> "For me, my focus is based on technology. I want to assure my client that they're purchasing a product that will work and be effective. So this precision, this technical and scientific rigor, I really manage to achieve it when I hire my first PhD because that's when we launch all the tests that will allow us to establish the market authorization procedures. [...] Today, I have always maintained this focus on research and development. So, in innovation, we have two-thirds of the workforce. Today, we must have around 20 employees, of the 20 employees, two-thirds are either engineers or doctors, and the rest are administrative, financial, and management services" (CEO – Case 5, translated from French to English).

Given the complexity inherent in technological development, such a strategy invariably calls for the combination of advanced HRM capabilities. Agtech firms well-developed with these capabilities are likely to find it easier to attract, retain, and motivate highly-skilled human capital (DEMIR; WENNBERG; MCKELVIE, 2017; HUSELID, 1995; POSTHUMA et al., 2013). This pool of highly qualified human resources allows 'high-tech' agtechs to better assess their resource base and strategically align it to adapt to their dynamic operating environment (GARCÍA-CABRERA; GARCÍA-SOTO; NIEVES, 2021).

Additionally, attracting and retaining a highly-qualified team can provide agtech companies access to specialized knowledge, which is occasionally non-codifiable and consequently challenging to transfer (NONAKA; TAKEUCHI, 1995). Indeed, a significant portion of the knowledge needed to develop innovations is generated outside of the R&D activities and is deeply embedded within human resources (CAPOZZA; DIVELLA, 2019; GARCÍA-CABRERA; GARCÍA-SOTO; NIEVES, 2021).

To achieve their objectives, 'high-tech' agtechs also need to foster capabilities that extend beyond technological and HRM domains. They can follow two distinct strategic patterns in terms of business strategy. The first pattern integrates financial and marketing capabilities within the 'high-tech' framework.

Case 3 exemplifies this strategic approach among 'high-tech' agtechs. The firm's robust HRM capabilities, which are inherent to this group of agtechs, enabled the firm to bring onboard experienced teams. These teams not only added their extensive knowledge but also their personal networks to the business (EGGERS et al., 2017). These personal networks, in many ways, compensate for the firm's limitations in networking capabilities. For instance, personal connections can prove valuable in opening doors and initiating collaborations (SABBADO et al., 2021). Additionally, these experienced and highly educated employees contribute their organizational and execution skills, compensating for essential areas typically lacking in these agtechs (see MARCONATTO et al., 2021). These findings are substantiated by the CMO interview in Case 3:

> “The second approach involves surrounding ourselves with experienced management teams that come with their own networks. So, some people joined the group very quickly, whether it was in the purchasing department or in industrial management, who had worked with the founders in other groups and who were experienced and arrived with their network. Specifically, for purchasing, we have an excellent manager who is Franco-Chinese and who has worked with the founders for a long time; he arrived with his network. The

> factory director, who was put in place by the new team, also came from... he knew the founders from before and had already been working in this role for about twenty years, so he arrived with his network" (CMO – Case 3, translated from French to English).

Marketing capabilities also play a pivotal role in these 'high-tech' agtechs. These capabilities, particularly when combined with financial capabilities, foster a unique and highly conducive environment that strengthens financial performance (BARBERO; CASILLAS; FELDMAN, 2011). As previously discussed, marketing capabilities empower agtech firms to better identify, engage with, and serve their respective markets (HAO; SONG, 2016; KAMBOJ; GOYAL; RAHMAN, 2015). This effectiveness typically translates into improved sales performance and increased cash flow. When these marketing capabilities are seamlessly integrated with financial ones, it results in a surplus of financial outcomes (BRINCKMANN; SALOMO; GEMUENDEN, 2011). This financial slack can pave the way for recruiting highly qualified personnel, acquiring additional resources, and funding growth initiatives, thus contributing to a virtuous cycle of sustained business expansion. The insights drawn from Case 3 further exemplify this scenario:

> "This has allowed us to continue dedicating our company's growth, both in terms of resources and personnel, to product design and preparation for market entry up until approval. Therefore, research, production, and approval make up the bulk of our resources, as for distribution, we are content with having lean sales and marketing teams who liaise with large accounts, who in turn will bring our products to market. For instance, we will sell our forest-related products by entering into an exclusivity contract for Europe with the third largest global company. They will sell our forest products to their clients through their sales forces across all European countries" (CMO – Case 3, translated from French to English).

The second strategic pattern followed by 'high-tech' agtechs is exemplified by Case 5. In contrast to the first group, these companies counterbalance their deficiency in financial and marketing capabilities with a set of innovation, networking, execution, and organizational capabilities, all within the 'high-tech' framework. Notably, this second cluster of 'high-tech' agtechs leans heavily on networking capabilities to tap into a range of external resources to mitigate their shortcomings. The critical importance of these capabilities to this group is underlined by the CEO of Case 5, who states:

> "So, from the start, it's very important to be connected to the entire ecosystem, you need to understand how it works and for that, you need to integrate

> yourself into it. You really have to be a part of this network. You need to join competitiveness clusters, you need to join networks. It was also a very political issue. So, I integrated myself into parliamentary circles, etc., so I participated in commissions at the National Assembly, sometimes even at the Elysée. I presented what we do to the president. Well, I had lunch with two presidents, with Hollande and with Macron. I have regular exchanges with ministers, with advisers. So, all of this is to tell you that I spend about 90% of my time not developing my business. In fact, I focus on the environment of my business. And that's really the role of the CEO" (CEO – Case 5, translated from French to English).

Organizational and execution capabilities also play a crucial role for these agtechs in mitigating the adverse impacts on cash flow resulting from insufficient financial capabilities (such as difficulties in securing new investments) and marketing capabilities (like challenges in scaling sales volume). For example, these competencies can mitigate challenges arising from technology and environmental shifts, which are particularly impactful for academic founders possessing minimal market knowledge and lacking prior professional investment experience (LÖFSTEN, 2016). Moreover, the refinement of execution capabilities could potentially empower agtechs to deepen their market knowledge and formulate more accurate predictions (YANG; SUN; ZHAO, 2019).

It's also vital to note that a restricted emphasis on marketing capabilities can be a strategic business decision. Agtechs within this group may consciously decide to outsource responsibilities in this domain. While outsourcing operations carries its own set of risks, it could prove beneficial under certain circumstances (SYMEONIDOU et al., 2022). Given that marketing is not an inherent strength for these businesses, investing resources in its development could entail significant costs without a guaranteed prospect of successful results.

For example, the management team of Case 5 opted for a B2B business model that demands less developed marketing capabilities given their circumstances. Under this framework, the agtech entrusts large corporations with the task of distributing their products to the end consumers. This approach leverages the broader market understanding and recognized legitimacy of these larger companies. The firm's CEO elucidates this strategic model as follows:

> "There are companies, for example, that after a phase like this, would say, "I'm going to hire salespeople to sell the product." On the contrary, I say, "I don't want salespeople, I want to focus on science, science, science." So, in fact, we consolidate our product knowledge through this innovation hub that we've been investing in for years, which allows us to have this credibility with our partners and funders. [...] And then, the other phase that I always had in

> mind from the start is that, in fact, it will always be easier for a company like Bayer or Syngenta to sell an innovation because they already know the market, they already know the distributors, they know the farmers, and this reputation is very strong among farmers, rather than me, who would come in saying, "My name is Case 5 (fictitious name), I have an innovation, and it's something that's going to change your life." That, in fact, wouldn't work, and that's why I decided to form partnerships with these large global firms" (CEO – Case 5, translated from French to English).

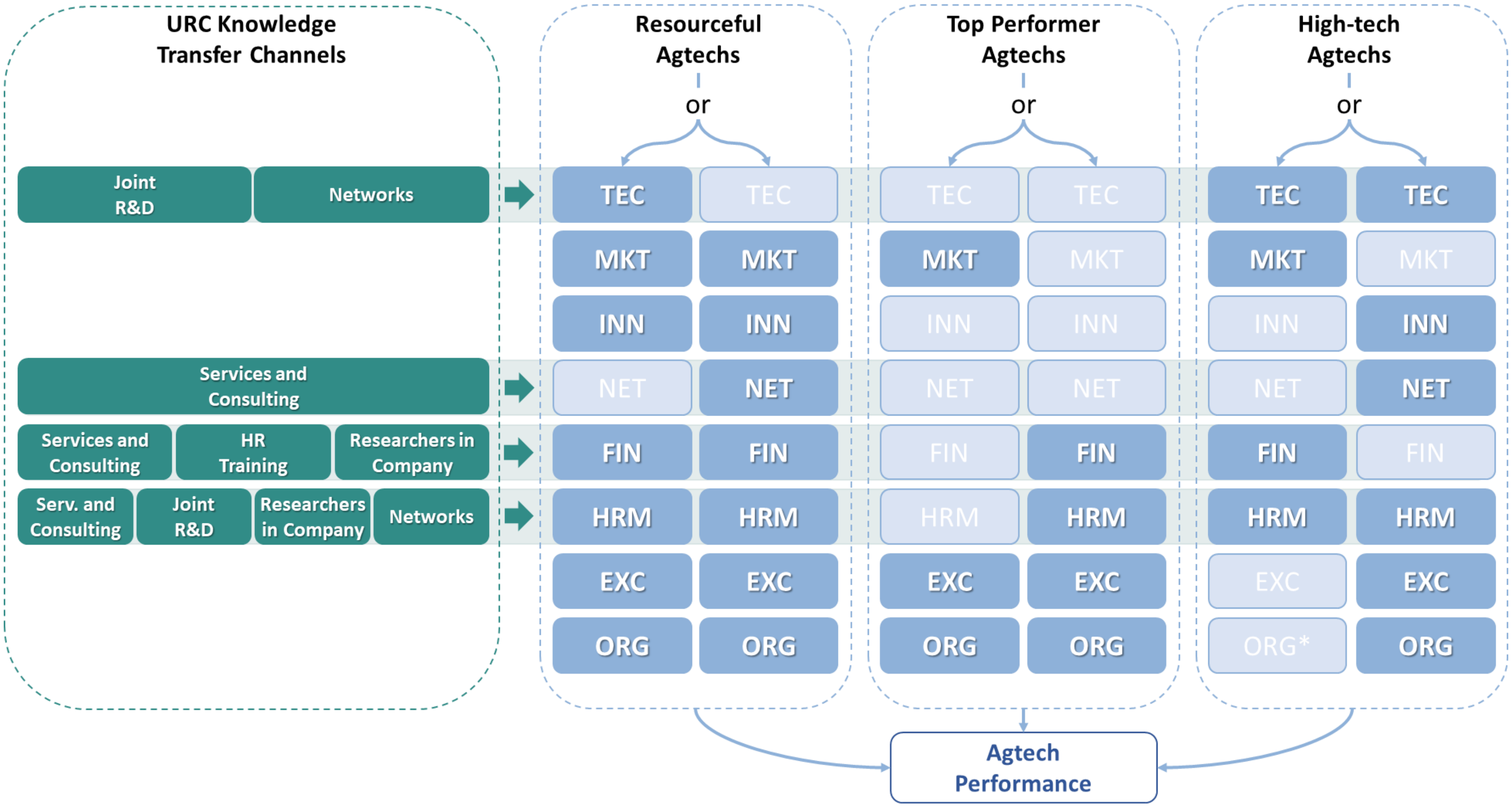
Regardless of the chosen business strategy, 'high-tech' agtechs derive significant benefits from the transfer of scientific knowledge from URCs. This transfer is a crucial factor for their success, particularly given their strong reliance on cutting-edge technological knowledge. In this regard, joint R&D and networks emerge as optimal choices for enhancing the technological capabilities of these agtechs.

Furthermore, recognizing the significance of HRM capabilities, French agtechs can also leverage services and consultancies, or the recruitment of researchers to strengthen their HRM capabilities. It is important to note that HRM capabilities are not only crucial for 'high-tech' agtechs but for all French agtechs. Among the six analyzed configurations, only one of them managed to achieve high performance without relying heavily on strong HRM capabilities. Therefore, the development of robust HRM capabilities becomes almost a mandatory prerequisite for the success of these ventures, as emphasized by the CEO of Case 4, whose team already consists of over 250 employees:

> "What is key for a founder, an entrepreneur, is to quickly hire and always recruit individuals who are better than oneself in every aspect. As an entrepreneur starts alone or with others, they do everything they can and in any way possible, so to speak, acting as a Swiss Army knife to the maximum extent. However, as time goes on, the crucial aspect is to recruit people who are better than oneself in all areas. Gradually, we delegate tasks that we used to handle ourselves. Instead of doing 150 things, I will do 130, then 120, then 110, then 90, then 80. Over time, we do less and less, but what remains is what we do best, and it becomes our strongest suit" (CEO – Case 5, translated from French to English).

Figure 23 illustrates the diverse configurations of ordinary capabilities that promote high performance in agtechs. Furthermore, this framework delineates the most efficient URC knowledge transfer channels for each type of adopted business strategy. In summary, mirroring our findings within the Brazilian context, our study reveals a diverse array of configurations of ordinary capabilities that foster exceptional performance in French agtechs. Our results argue against the notion of a predetermined, one-size-fits-all route to success. Instead, we unveil a diverse set of strategies and business models, each equally effective and requiring a unique set of well-coordinated ordinary capabilities. In the upcoming section, we present concluding observations drawn from our findings, demonstrating how the collective research results intersect with the existing body of literature. This underscores their significant contribution to bridging the identified theoretical gaps.

Figure 23 - Strategic Configuration of Ordinary Capabilities in French Agtechs



Notes: The figure employs blue rectangles to symbolize the ordinary capabilities that have been configured to increase the performance of agtechs. Rectangles with a lighter shade of blue indicate absent conditions, whereas those with a darker shade represent present conditions. The conditions marked with an asterisk could be either absent or present. Abbreviations: TEC = technological capabilities; MKT = marketing capabilities; INN = innovation capabilities; NET = networking capabilities; FIN = financial capabilities; HRM = human resource management capabilities; EXC = execution capabilities; ORG = organizational capabilities.

5.3.3 Closing Remarks from the Research Findings

The findings outlined in the preceding sections contribute significantly to both the Resource-Based View (RBV) and the Knowledge Spillover Theory of Entrepreneurship (KSTE).

From the RBV perspective, our research offers substantial insights into an emerging paradigm (SIRMON et al., 2011; see SIRMON; HITT; IRELAND, 2007; SYMEONIDOU et al., 2022; SYMEONIDOU; NICOLAOU, 2018). Within this new paradigm, we demonstrate that superior NTBF performance does not simply rest on the possession of valuable resources like ordinary capabilities. Instead, we emphasize that NTBF performance is chiefly reliant on how they strategically orchestrate and employ the resources at their disposal. Additionally, we throw light on the concept of capability complementarity, explaining how the combined effect of diverse ordinary capabilities can lead to superior outcomes beyond their individual impacts (AHMADI; O'CASS, 2018; FENG; MORGAN; REGO, 2017).

In addition, we respond to recent calls for more comprehensive research (e.g., NORDIN et al., 2018; ZAHRA, 2021) on how NTBFs orchestrate valuable resources across diverse contexts. Zahra (2021, p. 3) argued that "misconceptions persist also because researchers ignore the contextual variables that could affect the types and value of resources that startups need or have". Addressing this challenge, we investigated how NTBF firms from the same sector, with comparable age and size, but operating in entirely distinct institutional environments (Brazil and France), orchestrate eight fundamental ordinary capabilities. Our findings depict unique configurations in each context, demonstrating that a firm's contextual factors significantly influence resource orchestration.

Hence, our findings contribute to a research paradigm that extends beyond merely identifying whether a certain capability is essential for a particular type of business or quantifying its effect on performance measures. For instance, a myriad of studies reports conflicting results regarding the relevance of technological capabilities for NTBF performance. Some of these studies seem to presume that technological capabilities are always positively correlated with NTBF performance (e.g., FENG et al., 2019; MINOLA; HAHN; CASSIA, 2021), while others question this relationship (e.g., JIANG; MURMANN, 2022; TEIXEIRA et al., 2021a).

Nonetheless, our results propose a different perspective. We argue that there is no single capability universally indispensable for a certain type of company. For example, we illustrate that while technological and network capabilities may be vital for some agtech firms, they could be less crucial or even redundant for others, depending on their business strategy. Thus, our research enhances this evolving RBV paradigm by demonstrating that businesses, even those in similar circumstances within the same sector, can opt for varied business strategies to propel their growth. These divergent strategies, in turn, necessitate a unique combination of valuable capabilities and resources.

Therefore, our findings suggest that gauging the impact scale of a specific capability on a group of NTBFs, regardless of their apparent similarities, might be a misguided approach. Such an assessment would imply that this capability maintains equal importance across all these enterprises. In contrast, our findings reveal that different strategic paths demand varying capabilities, suggesting the diverse arrangements of capabilities could be equally effective across different businesses.

Within the framework of KSTE, our research provides three primary contributions. Firstly, our findings address the existing gaps in understanding how knowledge from URCs can generate economic and societal impacts beyond the URC setting (FINI et al., 2018). While most research focuses on internal URC metrics, such as patent count, spin-off numbers, and licensing agreements (HMIELESKI; POWELL, 2018), our study explores how eight Knowledge Transfer Channels (KTCs) assist NTBFs in developing crucial ordinary capabilities needed for business performance.

This perspective constitutes a unique contribution to the KSTE theory, as the majority of existing literature explores the interaction between URCs and the industry, with fewer studies dedicated to understanding the internal knowledge transfer mechanisms of URCs (KRUGER; STEYN, 2020). Examining this phenomenon from a standpoint external to the URC environment adds another layer of uniqueness to our findings. This approach considers potential divergences in how URCs and their associated enterprises perceive the support provided. For instance, URCs might perceive themselves as providing a comprehensive range of support to their enterprises, while the entrepreneurs might regard this support as limited, or vice versa (SCUOTTO et al., 2020).

Moreover, our decision to evaluate the impact of knowledge transferred from URCs at the firm level – outside of the URC setting – rather than delving into the metrics of knowledge generation within the URCs themselves, introduces a novel methodological approach. As highlighted by Jiang and Murmann (2022), empirical research often quantifies the extent and quality of knowledge transfer from URCs to NTBFs using simple proxies. These proxies include metrics such as the number of patents or spin-offs, rather than directly examining the flow of knowledge. This represents a frequent limitation of many studies, which assume a strong correlation between the knowledge held by URCs and the knowledge disseminated to NTBFs. However, this connection in itself does not necessarily imply that these knowledge flows genuinely have an impact on NTBFs (FRYGES; MÜLLER; NIEFERT, 2014).

Secondly, our research goes beyond the conventional focus on the flow of technological knowledge from URCs to NTBFs. As noted by Jiang and Murmann (2022), existing research in this field seems primarily focused on the transfer and impact of technical knowledge (e.g., AGARWAL et al., 2004; MINOLA; HAHN; CASSIA, 2021), often overlooking the transfer of other forms of knowledge, such as market-related know-how and managerial routines. These types of knowledge could be as beneficial, if not more so, to the performance of NTBFs compared to purely technical knowledge. For instance, our results underscore the significant role that HR training from URCs plays in cultivating financial capabilities amongst French agtech firms.

Thirdly, our study takes into consideration the inclusion of informal methods of knowledge transfer from URCs, acknowledging their crucial part in promoting knowledge exchange. In fact, a multitude of innovations and discoveries do not make it to the official records of URCs, but are instead disseminated via informal channels (FINI; LACETERA; SHANE, 2010). These informal channels, which are often systematically underappreciated, can result in biased perceptions regarding the efficacy and impact of knowledge transfer processes. Acknowledging this, recent research is advocating for a more comprehensive examination of the role these informal mechanisms (FINI et al., 2018). Addressing this issue, our study, for instance, reveals that the networks formed between URCs and French agtechs can offer substantial advantages to these firms, especially those with superior technological and HRM capabilities.

In conclusion, considering our findings collectively, it’s clear that the performance of NTBFs hinges not only on the possession of multiple ordinary capabilities (GARCÍA-CABRERA; GARCÍA-SOTO; OLIVARES-MESA, 2019;

PIASKOWSKA; TIPPMANN; MONAGHAN, 2021), but also critically depends on the strategic alignment and orchestration of these capabilities to support specific growth strategies. NTBFs' success, therefore, relies on the development and combination of ordinary capabilities that align with their unique business strategy. This strategic combination of capabilities, when executed correctly, empowers them to yield superior performance.

Moreover, our research emphasizes that these capability configurations cannot be indiscriminately replicated across diverse contexts. Given that entrepreneurial activity is greatly influenced by its context (KETATA; SOFKA; GRIMPE, 2015; PRIEM; BUTTLER, 2001), a particular set of ordinary capabilities that operate efficiently in one context may not perform well in another (BARBERO; CASILLAS; FELDMAN, 2011; DOBBS; HAMILTON, 2007). As a result, it becomes paramount for firms not only to contemplate their strategy but also to account for the institutional context in which they operate and the particular challenges it encompasses. Such an approach incites firms to adapt their capabilities in alignment with their growth strategies and the unique attributes of their operational environment.

Finally, taking into account the strategy and context of the firm, NTBFs can foster relationships with URCs within the knowledge ecosystems in which they operate. Enabled through various channels, these relationships assist NTBFs in overcoming their constraints, especially those concerning the development of ordinary capabilities vital for superior performance. Therefore, the triumph of NTBFs relies on their ability to develop and strategically orchestrate suitable capabilities, while leveraging the specialized knowledge procured from diverse URC knowledge transfer mechanisms, each of which exerts distinct impacts on their operations.

Figures 22 and 23 delineate the optimal alignment between strategy, ordinary capabilities, and URC knowledge transfer channels within different contexts (Brazil and France). These diagrams elucidate how strategic alignment can be fine-tuned to maximize knowledge transfer and effectively leverage ordinary capabilities, thereby bolstering overall NTBF performance.

6 CONCLUSIONS

In this study, we've explained that, while new technology-based firms (NTBFs) are typically founded with the goal of developing innovative, high-growth business models, most unfortunately cease operations within their initial years. This is corroborated by substantial research, which shows that only a select few NTBFs manage to overcome inherent challenges, and successfully establish a genuinely scalable and sustainable business that allows for exceptional performance.

NTBFs face a myriad of obstacles. Internally, these often include a shortage of critical resources such as financial capital, market expertise, and a skilled workforce, which are frequently identified as common constraints. Moreover, these firms usually operate within highly innovative and technologically advanced sectors, where the pace of market dynamics and the complexity of technology significantly amplify business risks. These are merely a few examples of the numerous hurdles encountered.

Given the sheer complexity and variety of challenges, survival and success in such dynamic environments necessitate the development of a wide range of ordinary capabilities. These empower NTBFs to effectively navigate their core business functions – to "keep the lights on" or "get things done right".

Yet, while there's a recognized need for NTBFs to develop ordinary capabilities to address these operational challenges, there is limited understanding as to which specific capabilities are necessary. Much of the research in this field, largely from the Resource-Based View (RBV) perspective, focuses on assessing the individual importance of particular capabilities. This approach, however, overlooks the multifaceted nature of NTBF challenges, which span across diverse operational areas such as marketing, finance, execution, etc. Consequently, while a particular capability might be valuable, it alone is unlikely to enable the firm to achieve the desired outcomes. Moreover, these studies often fail to consider the synergistic effect of these capabilities when leveraged in combination.

In line with this reasoning, our initial assumption is that the operational efficiency and overall performance of NTBFs rely on a comprehensive set of ordinary capabilities. Given that NTBFs can adopt various successful business strategies, even under similar resource conditions and within the same industry, it's plausible that these firms require distinct combinations of resources and capabilities. We thus propose the existence of multiple, equally efficient configurations of ordinary capabilities, each tailored to a specific business context.

Furthermore, given that entrepreneurial activity is significantly influenced by its operational context, it is reasonable to expect that NTBFs in different environments, even under similar conditions, require unique sets of capabilities. For example, in a context where venture capital is scarce, NTBFs may need to develop stronger financial capabilities, or seek alternative mechanisms. Conversely, those in contexts with abundant financial resources may require less emphasis on such capabilities. This implies that unique variations in capability configurations can be expected within each context.

These multifaceted challenges underscore the complexity involved in identifying and orchestrating the ordinary capabilities that are critical for NTBFs to achieve superior performance. Our literature review indicates that comprehensive studies addressing this intricate process of identifying and orchestrating ordinary capabilities within NTBFs are notably lacking.

Moreover, an additional substantial challenge in this context is how to develop the ordinary capabilities NTBFs need. Given that NTBFs generally operate with limited resources and often lack the necessary capabilities they need to succeed, they are inevitably required to develop or co-create these capabilities alongside their partners, such as universities and research centers (URCs). Notably, given the role of URCs as major contributors to specialized knowledge – a critical asset for NTBFs – many of these innovative ventures have emerged within scientific settings, fostering strong URC-industry connections. Through these collaborations, knowledge is transferred from URCs to NTBFs via an array of knowledge transfer channels, encompassing both formal and informal mechanisms.

Nonetheless, despite the recognized significance of these knowledge transfer mechanisms and the inherent value of knowledge as a resource, there remains a scant understanding of the impact of this specialized knowledge at the firm level. As indicated in our literature review, studies that primarily adopt a Knowledge Spillover Theory of Entrepreneurship (KSTE) perspective have not adequately addressed how knowledge is channeled through these diverse mechanisms and its subsequent repercussions beyond the URC environment. These studies predominantly focus on examining this phenomenon from the internal vantage point of URCs, often relying on simplistic metrics such as the number of patents and spin-offs generated.

Given the complexity involved in identifying, orchestrating, and developing ordinary capabilities that can create conditions conducive to superior performance in NTBFs, a fundamental question was addressed in this research: *How do universities and research centers (URCs) support the development of ordinary capabilities in new technology-based firms (NTBFs) through various knowledge transfer processes, and how do these resources contribute to improved business performance?*

To investigate our research question, we focused on agtechs, a specific type of NTBF that provides innovative solutions within the agribusiness and food sectors. Compared to other NTBFs, agtechs often face more significant challenges in terms of innovation and commercialization. These hurdles may create a high reliance on support and knowledge offered by URCs. We chose the Brazilian and French contexts for our study as both countries are key players in agribusiness yet have distinct institutional frameworks, providing a compelling research context.

We implemented a three-step mixed-method research approach. Initially, we conducted an exploratory systematic review of the relevant literature to understand the current knowledge landscape surrounding our research phenomena. From these findings, we developed an initial version of our research framework. The second step involved validating this framework through interviews with successful agtech entrepreneurs in Brazil and France.

For the third step, we gathered data from 48 Brazilian and 52 French agtechs through a survey. We analyzed this data using fuzzy-set Qualitative Comparative Analysis (fsQCA) methods, which helped us identify distinct configurations of ordinary capabilities utilized by agtechs in both contexts. Moreover, we used Mann–Whitney U tests to detect potential differences in the development of ordinary capabilities considering the level of usage across eight channels of URC knowledge transfer.

Our research makes significant theoretical and practical contributions. From a theoretical standpoint, we contribute to an emerging Resource-Based View (RBV) research paradigm. We demonstrate that superior NTBF performance relies on multiple ordinary capabilities. Additionally, we reveal that various capability combinations can yield similar performance outcomes, contingent on the business strategy employed by the firm. Interestingly, we found that these capability configurations differ across contexts, with three unique strategic patterns identified within each context, Brazil and France.

From a Knowledge Spillover Theory of Entrepreneurship (KSTE) perspective, our results underscore the heterogeneity of knowledge transfer from URCs. Each analyzed knowledge transfer channel proved effective for developing specific capabilities, and their effectiveness varied with context. For instance, while joint R&D bolstered the development of financial and HRM capabilities among French agtechs, this channel wasn't effective for capability development among Brazilian agtechs.

Methodologically, our research also contributes to the KSTE paradigm. We incorporated informal knowledge transfer channels, such as networking with URCs, addressing a known gap in KSTE studies. We also directly evaluated knowledge flow impact at the firm level, eschewing simplistic measures like patent count, which is a commonly employed approach in this field.

From a practical perspective, our empirical results have facilitated the creation of a framework (see Figures 23 and 24) that could act as a roadmap for agtech entrepreneurs. This tool can guide them in forming an optimal alignment between their business strategy, necessary capabilities, and the knowledge transfer channels to be engaged. This precise alignment could potentially enhance their chances of achieving superior performance results. This framework thus provides a valuable resource to those seeking to understand and navigate the complex landscape of knowledge transfer and capability development in the agtech industry.

6.1 LIMITATIONS AND FUTURE RESEARCH DIRECTIONS

While our study offers valuable contributions, we acknowledge four main limitations that highlight avenues for future research.

Firstly, our decision to focus solely on agtechs situates our findings within a specific, narrow segment of New Technology-Based Firms (NTBFs). It's crucial to recognize that different sectors – such as edtechs, adtechs, healthtechs, etc. – may pose unique challenges and technological intricacies, potentially resulting in diverse findings. Furthermore, even within the agtech sector, there is a diversity of subgroups. Some agtechs, for instance, might function as biotechnology developers, while others may specialize in creating solutions rooted in Information and Communication Technology (ICT) for agribusiness. Despite both being classified as agtechs, their fundamental differences could dictate unique capability needs.

Additionally, significant variations might exist among agtechs operating at different points in the supply chain. For example, agtechs engaged in upstream agricultural activities likely encounter challenges different from those faced by midstream and downstream agtechs. These disparities might require unique business strategies and capabilities. Consequently, future research could investigate these differences, contributing to the identification of potential nuances within these agtech subsets. Such exploration could provide a more detailed analysis of the pivotal factors for agtechs to progress and enhance their performance levels.

Secondly, the stage of business development notably influences the types of resources needed for agtechs to manage the unique challenges of each phase. Our research largely focused on agtechs in the growth and scale-up stages. However, we didn't explore the development and orchestration capabilities of seed and early-stage NTBFs. These firms, due to their specific challenges and lower levels of business maturity, which amplify their liabilities of smallness and newness, may require completely different capability sets.

Thirdly, the scope of our research did not allow for an in-depth examination of the intricate process through which knowledge transferred from URCs to NTBFs translates into firm-level capabilities. While our study did assess the impact of URC knowledge at the firm level, the underlying mechanisms remain largely unexplored. Furthermore, our research did not venture into the investigation of potential adverse effects that certain KTCs might have on capability development. Therefore, future studies could explore this phenomenon using a process-oriented and qualitative research approach, facilitating a more nuanced analysis of the process. This approach would also illuminate the understanding of how and why reliance on specific KTCs could potentially hinder the development of particular ordinary capabilities.

Finally, from a methodological perspective, our case selection process lacked perfect randomization, potentially limiting the generalizability of our findings. Additionally, the limited sample size hindered our capacity to test the reliability of constructs and assess causal relationships between variables. Future studies with larger, more robust samples and a refined case selection process could leverage mixed analysis approaches, combining configurational evidence with quantitative insights on the significance (effect size) of each ordinary capability for agtech performance. This approach would offer a more holistic understanding of the relationships between capabilities and performance in the agtech sector.

Appendix A – Research sample

ID	Authors	Sample	Country[1]	Firm Capability	Performance Measures	Findings (related to our subject)
01	Deeds (2001)	Startup	United States	Technical, Absorptive	Market value added (MVA)	An increase in three components of technical capability were positively correlated to MVA: R&D intensity, late-stage development activity, and absorptive capacity.
02	Lee et al. (2001)	Startup	South Korea	Technological	Sales growth	Technological capabilities (TC) are positively associated with startup performance. TC also have a positive effect on performance when they interact with social capital.
03	Atuahene-Gima and Li (2004)	NTV	China	Strategic decision making	New product performance, sales growth, new product quality	The relationship between strategic decision-making capability and performance is moderated by technology and demand uncertainty.
04	Yeoh (2004)	New Venture (technology startup)	United States	Technological learning, market learning, social learning	Export sales, satisfaction with profit changes	Marketing and social learning capabilities increase both export sales and satisfaction with changes in firm's net profit. However, technological learning capability only increases the first one.
05	Atuahene-Gima et al. (2006)	NTV	China	Marketing strategy innovativeness (MSI)	New product performance (market share, sales, and profit)	The relationship between MSI and new product performance depends on the external relationships of top management and environmental dynamism.
06	Wu (WU, 2007)	Startup	Taiwan	Dynamic Capabilities	ROI	DCs mediate the relationship between entrepreneur resources and firm performance. Without DCs, entrepreneurial resources do not translate into performance.
07	Burger-Helmchen (2009)	Startup	France	Technological/product innovation capability (TPIC), Business model/market innovation capability (BMIC)	Profitability, employment	Firm performance is influenced by the complementarity between TPIC and BMIC. Startups must be capable of creating new products and dealing with the organization of the new activity, the marketing mix and business model.

(continuation)

ID	Authors	Sample	Country[1]	Firm Capability	Performance Measures	Findings (related to our subject)
08	Zheng et al. (2010)	Startup	United States	Innovative	Firm valuation	Innovative capabilities have an increasingly positive effect on valuation as startups become older.
09	Lin et al. (2011)	Startup	United States	R&D capability	Profitability	Technological (R&D) capability is the major factor used to generate predictions of the venture's scope, assuming that the objective is to make operating profits .
10	Arora and Nandkumar (2012)	Startup	United States	Technological, Marketing	Firm performance (cash-outs and failure ratio)	Increasing the technology supply (TS) enhances the positive effect of marketing capability on performance. Diminishing TS, technological capabilities have greater effect. Both capabilities exert complementary effects on performance.
11	Ahmadi et al. (2014)	NTV	India	Technological, Marketing	Profit; Profitability, sales, customer satisfaction	Technology and marketing capabilities, coupled with technology and marketing resources, positively affect first product advantage, which in turn, affect performance.
12	Ortín-Ángel and Vendrell-Herrero (2014)	USO	Spain	Dynamic Capability	Net sales	In the long-term, university spin-offs have greater capabilities for developing wealth-creating business models than is the case for other NTBFs, but this is not the case during their first 2 or 3 years.
13	Bicen and Johnson (2015)	Startup	United States	Lean innovation capability	Innovation performance	Lean innovation capability enables firms to manage limited resources by reconfiguring and reallocating existing resources, thus, improving innovation performance.
14	Paradkar et al. (2015)	Startup	New Zealand	Dynamic Capability	Competitive advantage, survival	Dynamic capabilities have a greater impact on competitive advantage than other intangible and tangible assets. Alliances with partners are a particularly important asset.

(continuation)

ID	Authors	Sample	Country¹	Firm Capability	Performance Measures	Findings (related to our subject)
15	H. Zhou et al. (2016)	Startup	N/A	Technological, Marketing	Amount of VC funding	MC and TC exert a positive and complementary effect on the acquisition of venture capital funds. This complementarity exists only in the initial and not in later VC funding rounds.
16	Parida et al. (2017)	Startup	Sweden	Network	Customer performance, sales performance, innovation performance	Network capability, mediated by the firm innovativeness, boosts the performance of small businesses and high-tech startups.
17	Laurell et al. (2017)	New Venture (technology startup)	Sweden	Technological, regulatory, scientific, financing, marketing, sales	Multiple financial and non-financial measures	Business development and performance are greatly affected by how key actors leverage their network ties to develop critical capabilities across different business phases.
18	Ahmadi and O'Cass (AHMADI; O'CASS, 2018)	NTV	India	R&D, Marketing, Cross-functional collaboration (CFC), ICT	First product advantage (FPA)	A balanced view toward marketing and R&D capabilities positively affects FPA, which is positively moderated by CFC and ICT capabilities.
19	Ramírez-Alesón and Fernández-Olmos (2018)	NTBF	Spain	Technological	Innovation performance	Technological capabilities are positively related to innovation performance. The effect is greater in NTBFs located in Science Parks than off-park firms.
20	McGrath et al. (MCGRATH; MEDLIN; O'TOOLE, 2019)	Startup	Taiwan	Network	Employment	Network capability plays a significant role in attaining, adapting and jointly integrating external resources to survive selection pressures and grow their business over time.
21	Sedita et al. (SEDITA et al., 2019)	Startup	Italy	Business (marketing and managerial), Technical (technological and ICT)	Innovation performance (turnover from new products)	Technical capabilities positively influence innovation performance. This effect is augmented by incubation programs. Business capabilities does not affect performance.

(conclusion)

ID	Authors	Sample	Country²	Dynamic Capability	Performance Measures	Findings (related to our subject)
22	Dong (2019)	Startup	The Netherlands	Demand-driven digital disruption, Fast digital adaptation (FDA), Continuous digital transplantation	Revenue growth, user satisfaction	FDA has been found to play a key role in generating revenue growth and user satisfaction by capturing entrepreneurial opportunities in the regulatory environment, which could be repurposed in another environment.
23	Deligianni et al. (DELIGIANNI et al., 2019)	Startup	Greece	Technological competence (TC)	Product innovation	TC has an inverted U-shaped relationship with product innovation, which is positively moderated by entrepreneurs' political competence and prior startup experience.
24	Pearce and Pearce II (2019)	Startup	United States	R&D, Omnichannel Marketing	Overall performance, high growth	R&D and omnichannel marketing capabilities are prevalent among the 12 combinations of attributes that startups rely on to achieve high growth.
25	F. Jensen et al. (JENSEN; LÖÖF; STEPHAN, 2020)	Startup	Germany	Technological, Innovation	Market novelties	Cleantech startups perform better and have higher technological capabilities than non-Cleantech startups.
26	Harms and Schwery (2020)	Startup	Germany	Lean startup (LSC)	Performance (quality, cost, and time)	There is a positive relationship between LSC and performance, irrespective of market uncertainty, technological uncertainty, and the degree of innovativeness.
27	Behl (2022)	Startup	India and China	Big data analytics (BDAC)	Performance (profit, return on sales, market share and sales volume)	BDAC have a positive and significant impact on firm performance and competitive advantage of tech startups, positively moderated by organizational culture.

Source: research data.
Note: [1]Sample origin.

Appendix B – Papers identified in the initial search (N = 584)

ID	Authors	Title	Year	Journal	H-Index	Quartile
1	Townsend, DM; Hunt, RA; McMullen, JS; Sarasvathy, SD	Uncertainty, Knowledge Problems, And Entrepreneurial Action	2018	ACADEMY OF MANAGEMENT ANNALS	61	Q1
2	Argyres, N; Mostafa, R	Knowledge Inheritance, Vertical Integration, And Entrant Survival in The Early Us Auto Industry	2016	ACADEMY OF MANAGEMENT JOURNAL	304	Q1
3	Atuahene-Gima, K; Li, HY	Strategic Decision Comprehensiveness and New Product Development Outcomes in New Technology Ventures	2004	ACADEMY OF MANAGEMENT JOURNAL	304	Q1
4	Ganco, M; Agarwal, R	Performance Differentials Between Diversifying Entrants and Entrepreneurial Start-Ups: A Complexity Approach	2009	ACADEMY OF MANAGEMENT REVIEW	260	Q1
5	Zuzul, T; Tripsas, M	Start-Up Inertia Versus Flexibility: The Role of Founder Identity in a Nascent Industry	2020	ADMINISTRATIVE SCIENCE QUARTERLY	175	Q1
6	Zhou, KZ; Gao, GY; Zhao, HX	State Ownership and Firm Innovation in China: An Integrated View Of Institutional And Efficiency Logics	2017	ADMINISTRATIVE SCIENCE QUARTERLY	175	Q1
7	Middermann, LH; Rashid, L	Cross-Country Differences in Entrepreneurial Internationalization Tendencies: Evidence from Germany and Pakistan	2019	ADMINISTRATIVE SCIENCES	-	-
8	Hernandez, MA	Unveiling International New Ventures' Success: Employee's Entrepreneurial Behavior	2019	ADMINISTRATIVE SCIENCES	-	-
9	Suzuki, S; Okamuro, H	Determinants Of Academic Startups' Orientation Toward International Business Expansion	2017	ADMINISTRATIVE SCIENCES	-	-
10	Gray A., Boehlje M., Amanor-Boadu V., Fulton J.	Agricultural Innovation and New Ventures: Assessing the Commercial Potential	2004	AMERICAN JOURNAL OF AGRICULTURAL ECONOMICS	104	Q1
11	Bosma, N; Schutjens, V	Understanding Regional Variation in Entrepreneurial Activity And Entrepreneurial Attitude In Europe	2011	ANNALS OF REGIONAL SCIENCE	59	Q1
12	Denard, Samuel;Ertas, Atila;Mengel, Susan;Ekwaro-Osire, Stephen	Development Cycle Modeling: Resource Estimation	2020	APPLIED SCIENCES	17	Q1

ID	Authors	Title	Year	Journal	H-Index	Quartile
13	Santos, Ricardo Manuel dos;Buehler, Leo;Lawson, Zoe;Marzari, Stefano;Stachura, Monika;Stora, Thierry;collaboration, CERN-MEDICIS	CERN-MEDICIS (Medical Isotopes Collected From ISOLDE): A New Facility	2014	APPLIED SCIENCES	17	Q1
14	Mac, L; Evangelista, F	Transforming Learning into Export Performance by Chinese Firms	2017	ASIA PACIFIC BUSINESS REVIEW	33	Q2
15	Chin, T; Liu, RH; Yang, XM	'Reverse Internationalization' In Chinese Firms: A Study of How Global Startup Oems Seek To Compete Domestically	2016	ASIA PACIFIC BUSINESS REVIEW	33	Q2
16	Park, YJ; Park, YW	Spinoffs Versus Non-Spinoff Entrepreneurs Exploring Post-Bubble Japan's Entrepreneurial Ecosystem	2018	ASIA PACIFIC JOURNAL OF INNOVATION AND ENTREPRENEURSHIP	-	-
17	Tsang, EWK	Family Firms and Internationalization: An Organizational Learning Perspective	2020	ASIA PACIFIC JOURNAL OF MANAGEMENT	74	Q1
18	Tzeng, CH; Beamish, PW; Chen, SF	Institutions And Entrepreneurship Development: High-Technology Indigenous Firms In China And Taiwan	2011	ASIA PACIFIC JOURNAL OF MANAGEMENT	74	Q1
19	Li, HY; Li, J	Top Management Team Conflict And Entrepreneurial Strategy Making In China	2009	ASIA PACIFIC JOURNAL OF MANAGEMENT	74	Q1
20	Menzies J.L., Orr S.C.	Internationalization Of Boost Juice To Malaysia	2014	ASIAN CASE RESEARCH JOURNAL	3	Q4
21	Gupta R., Pandit A.	Ferns N Petals: Transforming An Unorganized Business Into An Organized One	2012	ASIAN CASE RESEARCH JOURNAL	3	Q4
22	Kim, H	Determinants Of Technology-Based Spin-Offs Created By Universities In Korea	2020	ASIAN JOURNAL OF TECHNOLOGY INNOVATION	12	Q3
23	Huang, YL; Intarakumnerd, P	Alternative Technological Learning Paths Of Taiwanese Firms	2019	ASIAN JOURNAL OF TECHNOLOGY INNOVATION	12	Q3
24	Park, DS; Cho, KT	What Factors Contribute To The Creation Of Spin-Offs? The Case Of Government-Funded Research Institutes In Korea	2019	ASIAN JOURNAL OF TECHNOLOGY INNOVATION	12	Q3

ID	Authors	Title	Year	Journal	H-Index	Quartile
25	Su, DJ; Sohn, DW	Roles Of Entrepreneurial Orientation And Guanxi Network With Parent University In Start-Ups' Performance: Evidence From University Spin-Offs In China	2015	ASIAN JOURNAL OF TECHNOLOGY INNOVATION	12	Q3
26	Sohn, DW; Kim, HJ; Hur, W	Effect Of Venture Capital And Government Support On The Performance Of Venture Firms In Korea	2012	ASIAN JOURNAL OF TECHNOLOGY INNOVATION	12	Q3
27	Park, S	The Effects Of Entry Timing And Business Model Innovation On Performance: The Case Of The Global MP3 Player Market	2011	ASIAN JOURNAL OF TECHNOLOGY INNOVATION	12	Q3
28	Ghosh D., Mehta P., Avittathur B.	Supply Chain Capabilities And Competitiveness Of High-Tech Manufacturing Start-Ups In India	2019	BENCHMARKING	57	Q2
29	Caiazza R.	Benchmarking Of Business Incubators	2014	BENCHMARKING	57	Q2
30	Galambos L., Sturchio J.L.	Pharmaceutical Firms And The Transition To Biotechnology: A Study In Strategic Innovation	1998	BUSINESS HISTORY REVIEW	27	Q1
31	Saarikko, Ted	Digital Transformation: Five Recommendations For The Digitally Conscious Firm	2020	BUSINESS HORIZONS	76	Q1
32	Pearce, DD; Pearce, JA	Distinguishing Attributes Of High-Growth Ventures	2020	BUSINESS HORIZONS	76	Q1
33	Ferras-Hernandez, X; Tarrats-Pons, E; Arimany-Serrat, N	Disruption In The Automotive Industry: A Cambrian Moment	2017	BUSINESS HORIZONS	76	Q1
34	Picken, JC	From Founder To CEO: An Entrepreneur's Roadmap	2017	BUSINESS HORIZONS	76	Q1
35	Jagersma P.K., van Gorp D.M.	Spin-Out Management: Theory And Practice	2003	BUSINESS HORIZONS	76	Q1
36	Venturini, K; Verbano, C	Open Innovation In The Public Sector Resources And Performance Of Research-Based Spin-Offs	2017	BUSINESS PROCESS MANAGEMENT JOURNAL	76	Q1
37	Marra, Alessandro;Carlei, Vittorio;Baldassari, Cristiano	Exploring Networks Of Proximity For Partner Selection, Firms' Collaboration And Knowledge Exchange. The Case Of Clean-Tech Industry	2020	BUSINESS STRATEGY AND THE ENVIRONMENT	94	Q1
38	Jensen, F; Loof, H; Stephan, A	New Ventures In Cleantech: Opportunities, Capabilities And Innovation Outcomes	2020	BUSINESS STRATEGY AND THE ENVIRONMENT	94	Q1
39	Wicki, S; Hansen, EG	Green Technology Innovation: Anatomy Of Exploration Processes From A Learning Perspective	2019	BUSINESS STRATEGY AND THE ENVIRONMENT	94	Q1
40	Beckman, SL	To Frame Or Reframe: Where Might Design Thinking Research Go Next?	2020	CALIFORNIA MANAGEMENT REVIEW	124	Q1

ID	Authors	Title	Year	Journal	H-Index	Quartile
41	Garbuio, M; Lin, N	Artificial Intelligence As A Growth Engine For Health Care Startups: Emerging Business Models	2019	CALIFORNIA MANAGEMENT REVIEW	124	Q1
42	Freeman, J; Engel, JS	Models Of Innovation: Startups And Mature Corporations	2007	CALIFORNIA MANAGEMENT REVIEW	124	Q1
43	Schafer, S; Henn, S	The Evolution Of Entrepreneurial Ecosystems And The Critical Role Of Migrants. A Phase-Model Based On A Study Of IT Startups In The Greater Tel Aviv Area	2018	CAMBRIDGE JOURNAL OF REGIONS, ECONOMY AND SOCIETY	48	Q1
44	Smith, HL; Romeo, S; Bagchi-Sen, S	Oxfordshire Biomedical University Spin-Offs: An Evolving System	2008	CAMBRIDGE JOURNAL OF REGIONS, ECONOMY AND SOCIETY	48	Q1
45	Lin, HF; Murphree, M; Li, SL	Emergence Of Organizational Routines In Entrepreneurial Ventures	2017	CHINESE MANAGEMENT STUDIES	21	Q2
46	Jin, CH	The Effect Of Psychological Capital On Start-Up Intention Among Young Start-Up Entrepreneurs A Cross-Cultural Comparison	2017	CHINESE MANAGEMENT STUDIES	21	Q2
47	Turcan, RV; Juho, A	Have We Made It? Investigating Value-Creating Strategies In Early Internationalizing Ventures	2016	COMPETITIVENESS REVIEW	23	Q1
48	Hsu, CHC; Liu, ZP; Huang, SS	Acquiring Intangible Resources Through Entrepreneurs' Network Ties: A Study Of Chinese Economy Hotel Chains	2015	CORNELL HOSPITALITY QUARTERLY	68	Q1
49	Korper, AK; Patr?cio, L; Holmlid, S; Witell, L	Service Design As An Innovation Approach In Technology Startups: A Longitudinal Multiple Case Study	2020	CREATIVITY AND INNOVATION MANAGEMENT	55	Q1
50	Bicen, P; Johnson, WHA	Radical Innovation With Limited Resources In High-Turbulent Markets: The Role Of Lean Innovation Capability	2015	CREATIVITY AND INNOVATION MANAGEMENT	55	Q1
51	Navas, BOG; Manzanares, MJD; Gomez, FG	Social Capital As A Theoretical Approach In Strategic Management	2019	CUADERNOS DE GESTION	11	Q4
52	Kumar, S; Das, S	Integrated Framework Of Strategic Orientation, Value Offerings And New Venture Performance	2020	DECISION	13	Q1
53	Stam E.	Why Butterflies Don't Leave: Locational Behavior Of Entrepreneurial Firms	2007	ECONOMIC GEOGRAPHY	79	Q1
54	Bocken N.M.P., Miller K., Weissbrod I., Holgado M., Evans S.	Business Model Experimentation For Circularity: Driving Sustainability In A Large International Clothing Retailer	2017	ECONOMICS AND POLICY OF ENERGY AND THE ENVIRONMENT	6	Q4

ID	Authors	Title	Year	Journal	H-Index	Quartile
55	Rosales, MA; Marin, JMN	Technological Capabilities Accumulation And Internationalization Strategies Of Mexican Biotech Firms: A Multi Case Study From Agro-Food & Pharma Industries	Ahead	ECONOMICS OF INNOVATION AND NEW TECHNOLOGY	49	Q1
56	Ferrary, M; Granovetter, M	The Role Of Venture Capital Firms In Silicon Valley's Complex Innovation Network	2009	ECONOMY AND SOCIETY	88	Q1
57	Hietanen L.	Facilitating Employees' And Students' Process Towards Nascent Entrepreneurship	2015	EDUCATION AND TRAINING	62	Q1
58	Dellermann, D; Lipusch, N; Ebel, P; Leimeister, JM	Design Principles For A Hybrid Intelligence Decision Support System For Business Model Validation	2019	ELECTRONIC MARKETS	29	Q1
59	Sinha A., Jha S., Amritesh	Green Agrevolution Pvt Ltd: Delivering 360° "Seed-To-Market" Solution	2019	EMERALD EMERGING MARKETS CASE STUDIES	4	Q3
60	Puri R.	Mocdoc.In: Choreographing Online Healthcare Kingdom	2015	EMERALD EMERGING MARKETS CASE STUDIES	4	Q3
61	Jabeen F., Ahmad S.Z., Khan M.	Slices: What Is Next?	2015	EMERALD EMERGING MARKETS CASE STUDIES	4	Q3
62	Zhai, JZ; Carrick, J	The Rise Of The Chinese Unicorn: An Exploratory Study Of Unicorn Companies In China	2019	EMERGING MARKETS FINANCE AND TRADE	29	Q1
63	Heinrich T.	Cold War Armory: Military Contracting In Silicon Valley	2002	ENTERPRISE AND SOCIETY	24	Q1
64	Snehal S., Ranjany S., Krishnashree A.	Assessing And Comparing Top Accelerators In Brazil, India, And The USA: Through The Lens Of New Ventures' Performance	2020	ENTREPRENEURIAL BUSINESS AND ECONOMICS REVIEW	8	Q2
65	Albert, MG	Entrepreneurship, Innovation And Regional Performance: Application For The Spanish Regions	2017	ENTREPRENEURSHIP AND REGIONAL DEVELOPMENT	83	Q1
66	Parida, V; Pesamaa, O; Wincent, J; Westerberg, M	Network Capability, Innovativeness, And Performance: A Multidimensional Extension For Entrepreneurship	2017	ENTREPRENEURSHIP AND REGIONAL DEVELOPMENT	83	Q1
67	Van Geenhuizen, M	Knowledge Networks Of Young Innovators In The Urban Economy: Biotechnology As A Case Study	2008	ENTREPRENEURSHIP AND REGIONAL DEVELOPMENT	83	Q1

ID	Authors	Title	Year	Journal	H-Index	Quartile
68	Slavik, S; Hagarova, R; Ljudvigova, I; Zagorsek, B	Business Model And Team As Preconditions Of A Start-Up Viability	2019	ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES	18	Q1
69	Ismail, A	A Framework For Designing Business-Acceleration Programs: A Case Study From Egypt	2020	ENTREPRENEURSHIP RESEARCH JOURNAL	11	Q2
70	Franco-Leal, N; Camelo-Ordaz, C; Fernandez-Alles, M; Sousa-Ginel, E	The Entrepreneurial Ecosystem: Actors And Performance In Different Stages Of Evolution Of Academic Spinoffs	2020	ENTREPRENEURSHIP RESEARCH JOURNAL	11	Q2
71	Jagoda, K; Lin, XH; Calvert, V; Tao, S	Accountability Of Venture Support Agencies: Do They Really Help?	2016	ENTREPRENEURSHIP RESEARCH JOURNAL	11	Q2
72	Sui, S; Baum, M; Malhotra, S	How Home-Peers Affect The Export Market Exit Of Small Firms: Evidence From Canadian Exporters	2019	ENTREPRENEURSHIP THEORY AND PRACTICE	140	Q1
73	Miller, D; Le Breton-Miller, I	Sources Of Entrepreneurial Courage And Imagination: Three Perspectives, Three Contexts	2017	ENTREPRENEURSHIP THEORY AND PRACTICE	140	Q1
74	Autio, E; George, G; Alexy, O	International Entrepreneurship And Capability Development-Qualitative Evidence And Future Research Directions	2011	ENTREPRENEURSHIP THEORY AND PRACTICE	140	Q1
75	Meuleman, M; Amess, K; Wright, M; Scholes, L	Agency, Strategic Entrepreneurship, And The Performance Of Private Equity-Backed Buyouts	2009	ENTREPRENEURSHIP THEORY AND PRACTICE	140	Q1
76	Habbershon, TG	Commentary: A Framework For Managing The Familiness And Agency Advantages In Family Firms	2006	ENTREPRENEURSHIP THEORY AND PRACTICE	140	Q1
77	Brown, R; Mawson, S	Targeted Support For High Growth Firms: Theoretical Constraints, Unintended Consequences And Future Policy Challenges	2016	ENVIRONMENT AND PLANNING C-GOVERNMENT AND POLICY	-	-
78	Maennig, W; Olschlager, M; Schmidt-Trenz, HJ	Organisations And Regional Innovative Capability: The Case Of The Chambers Of Commerce And Industry In Germany	2015	ENVIRONMENT AND PLANNING C-GOVERNMENT AND POLICY	-	-
79	van Geenhuizen, M	How Can We Reap The Fruits Of Academic Research In Biotechnology? In Search Of Critical Success Factors In Policies For New-Firm Formation	2003	ENVIRONMENT AND PLANNING C-GOVERNMENT AND POLICY	-	-
80	Gentile, C; Morales-Espana, G; Ramos, A	A Tight MIP Formulation Of The Unit Commitment Problem With Start-Up And Shut-Down Constraints	2017	EURO JOURNAL ON COMPUTATIONAL OPTIMIZATION	11	Q1

ID	Authors	Title	Year	Journal	H-Index	Quartile
81	Lofsten, H	Organisational Capabilities and The Long-Term Survival of New Technology-Based Firms	2016	EUROPEAN BUSINESS REVIEW	39	Q1
82	Gabrielsson M., Sasi V., Darling J.	Finance Strategies of Rapidly-Growing Finnish SMEs: Born Internationals And Born Globals	2004	EUROPEAN BUSINESS REVIEW	39	Q1
83	Steiber, A; Alange, S	Corporate-Startup Collaboration: Effects On Large Firms' Business Transformation	Ahea d	EUROPEAN JOURNAL OF INNOVATION MANAGEMENT	57	Q2
84	Rui, ZY; Lyytinen, K	How Do Ventures Become More Innovative? The Effect Of External Search And Ambidextrous Knowledge Integration	2019	EUROPEAN JOURNAL OF INNOVATION MANAGEMENT	57	Q2
85	Battistella, C; De Toni, AF; Pessot, E	Open Accelerators For Start-Ups Success: A Case Study	2017	EUROPEAN JOURNAL OF INNOVATION MANAGEMENT	57	Q2
86	Ruokolainen J.	Constructing The First Customer Reference To Support The Growth Of A Start-Up Software Technology Company	2008	EUROPEAN JOURNAL OF INNOVATION MANAGEMENT	57	Q2
87	Dubocage, E; Galindo, G	Understanding Founder-CEO's Replacement In Venture-Backed Companies: A Theoretical And Empirical Analysis	2014	EUROPEAN MANAGEMENT JOURNAL	99	Q1
88	Kuivalainen, O; Saarenketo, S; Puumalainen, K	Start-Up Patterns Of Internationalization: A Framework And Its Application In The Context Of Knowledge-Intensive Smes	2012	EUROPEAN MANAGEMENT JOURNAL	99	Q1
89	Ferrary, M	Specialized Organizations And Ambidextrous Clusters In The Open Innovation Paradigm	2011	EUROPEAN MANAGEMENT JOURNAL	99	Q1
90	Mariano, S; Casey, A	The Dynamics Of Organizational Routines In A Startup: The Ereda Model	2016	EUROPEAN MANAGEMENT REVIEW	29	Q2
91	Debrulle, J; Maes, J	Start-Ups' Internationalization: The Impact Of Business Owners' Management Experience, Start-Up Experience And Professional Network On Export Intensity	2015	EUROPEAN MANAGEMENT REVIEW	29	Q2
92	Flatten, TC; Greve, GI; Brettel, M	Absorptive Capacity And Firm Performance In Smes: The Mediating Influence Of Strategic Alliances	2011	EUROPEAN MANAGEMENT REVIEW	29	Q2
93	Giarratana, MS	Missing The Starting Gun: De Alio Entry Order In New Markets, Inertia And Real Option Capabilities	2008	EUROPEAN MANAGEMENT REVIEW	29	Q2
94	Fayoumi, A; Loucopoulos, P	Conceptual Modeling For The Design Of Intelligent And Emergent Information Systems	2016	EXPERT SYSTEMS WITH APPLICATIONS	184	Q1
95	Cantu, FJ; Ceballos, HG	A Multiagent Knowledge And Information Network Approach For Managing Research Assets	2010	EXPERT SYSTEMS WITH APPLICATIONS	184	Q1

ID	Authors	Title	Year	Journal	H-Index	Quartile
96	Littunen H.	Management Capabilities And Environmental Characteristics In The Critical Operational Phase Of Entrepreneurship—A Comparison Of Finnish Family And Nonfamily Firms	2003	FAMILY BUSINESS REVIEW	96	Q1
97	Kalayci, E	Stakeholder Relationships In The Framework Of R&D-Based Startups: Evidence From Turkey	2017	FORESIGHT AND STI GOVERNANCE	13	Q2
98	Obraztsova, O; Poliakova, T; Popovskaya, E	The Choice Of Funding Sources For Start-Ups In A Transitional Economy: The Ability To Predict In A National Context	2017	FORESIGHT AND STI GOVERNANCE	13	Q2
99	Tikkanen, Jukka	Participatory Turn - And Down-Turn - In Finland's Regional Forest Programme Process	2018	FOREST POLICY AND ECONOMICS	64	Q1
100	Recardo R.J.	Beyond The Administrivia: Incorporating Best Practices To Strengthen Your Human Resources Strategic Plan	2017	GLOBAL BUSINESS AND ORGANIZATIONAL EXCELLENCE	15	Q3
101	Yang X.	The Impact Of Corporate Emotional Intelligence On Innovation: Observations From China	2016	GLOBAL BUSINESS AND ORGANIZATIONAL EXCELLENCE	15	Q3
102	Ohara S.C., Cherniss M.	Storytelling At Juniper Networks Connects A Global Organization To The Values And Behaviors Of Success	2010	GLOBAL BUSINESS AND ORGANIZATIONAL EXCELLENCE	15	Q3
103	Kimura K.	Overseas Expansion And Technological Capabilities: The Case Of Chinese Electronics Firms	2019	GLOBAL JOURNAL OF EMERGING MARKET ECONOMIES	8	Q3
104	Fujiwara T.	Potential And Challenges For Start-Ups In Japan's Biotech Industry	2016	GLOBAL JOURNAL OF FLEXIBLE SYSTEMS MANAGEMENT	28	Q1
105	Cunningham, J; Anderson, AR	Inspired Or Foolhardy: Sensemaking, Confidence And Entrepreneurs' Decision-Making	2018	GROUP DECISION AND NEGOTIATION	57	Q1
106	Chang C.-P., Nagel D., Zaghloul M.	Go With The (Micro) Flow	2008	IEEE POTENTIALS	31	Q3
107	Marion, T; Dunlap, D; Friar, J	Instilling The Entrepreneurial Spirit In Your R&D Team: What Large Firms Can Learn From Successful Start-Ups	2012	IEEE TRANSACTIONS ON ENGINEERING MANAGEMENT	89	Q1
108	Song, LZ; Di Benedetto, CA; Song, M	Competitive Advantages In The First Product Of New Ventures	2010	IEEE TRANSACTIONS ON ENGINEERING MANAGEMENT	89	Q1

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110	Prashantham, S; Kumar, K	Engaging With Startups: MNC Perspectives	2019	IIMB MANAGEMENT REVIEW	18	Q2
111	Cantu, C	Discovering The Collective Entrepreneurial Opportunities Through Spatial Relationships	2018	IMP JOURNAL	-	-
112	Cantu, C; Giorgia, S; Tzannis, A	Exploring The Role Of Business Relationships In Start-Ups' Life Cycles: Evidences From The Italian Context	2018	IMP JOURNAL	-	-
113	Appelbaum, SH; Calla, R; Desautels, D; Hasan, LN	The Challenges Of Organizational Agility: Part 2	2017	INDUSTRIAL AND COMMERCIAL TRAINING	30	Q2
114	Ching, K; Gans, J; Stern, S	Control Versus Execution: Endogenous Appropriability And Entrepreneurial Strategy	2019	INDUSTRIAL AND CORPORATE CHANGE	104	Q1
115	Adams, P; Fontana, R; Malerba, F	Linking Vertically Related Industries: Entry By Employee Spinouts Across Industry Boundaries	2019	INDUSTRIAL AND CORPORATE CHANGE	104	Q1
116	Ching, K	Exaptation Dynamics And Entrepreneurial Performance: Evidence From The Internet Video Industry	2016	INDUSTRIAL AND CORPORATE CHANGE	104	Q1
117	Muscio, A; Quaglione, D; Vallanti, G	University Regulation And University-Industry Interaction: A Performance Analysis Of Italian Academic Departments	2015	INDUSTRIAL AND CORPORATE CHANGE	104	Q1
118	Colombo, MG; Giannangeli, S; Grilli, L	Public Subsidies And The Employment Growth Of High-Tech Start-Ups: Assessing The Impact Of Selective And Automatic Support Schemes	2013	INDUSTRIAL AND CORPORATE CHANGE	104	Q1
119	Arvanitis, S; Stucki, T	What Determines The Innovation Capability Of Firm Founders?	2012	INDUSTRIAL AND CORPORATE CHANGE	104	Q1
120	Fontana, R; Malerba, F	Demand As A Source Of Entry And The Survival Of New Semiconductor Firms	2010	INDUSTRIAL AND CORPORATE CHANGE	104	Q1
121	Zaring, O; Eriksson, CM	The Dynamics Of Rapid Industrial Growth: Evidence From Sweden's Information Technology Industry, 1990-2004	2009	INDUSTRIAL AND CORPORATE CHANGE	104	Q1
122	Chang C.-C.	Exploring IT Entrepreneurs' Dynamic Capabilities Using Q-Technique	2012	INDUSTRIAL MANAGEMENT AND DATA SYSTEMS	96	Q1
123	Lin C., Jiang J.L., Wu Y.-J., Chang C.C.	Assessment Of Commercialization Strategy Using R&D Capability	2011	INDUSTRIAL MANAGEMENT AND DATA SYSTEMS	96	Q1

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125	La Rocca, Antonella	Mobilizing Suppliers When Starting Up A New Business Venture	2020	INDUSTRIAL MARKETING MANAGEMENT	125	Q1
126	McGrath, H; Medlin, CJ; O'Toole, T	A Process-Based Model Of Network Capability Development By A Start-Up Firm	2019	INDUSTRIAL MARKETING MANAGEMENT	125	Q1
127	La Rocca, A; Perna, A; Snehota, I; Ciabuschi, F	The Role Of Supplier Relationships In The Development Of New Business Ventures	2019	INDUSTRIAL MARKETING MANAGEMENT	125	Q1
128	Nordin, F; Ravald, A; Moller, K; Mohr, JJ	Network Management In Emergent High-Tech Business Contexts: Critical Capabilities And Activities	2018	INDUSTRIAL MARKETING MANAGEMENT	125	Q1
129	Brink, Tove	Organising Of Dynamic Proximities Enables Robustness, Innovation And Growth: The Longitudinal Case Of Small And Medium-Sized Enterprises (Smes) In Food Producing Firm Networks	2018	INDUSTRIAL MARKETING MANAGEMENT	125	Q1
130	Ahmadi, H; O'Cass, A	Transforming Entrepreneurial Posture Into A Superior First Product Market Position Via Dynamic Capabilities And TMT Prior Start-Up Experience	2018	INDUSTRIAL MARKETING MANAGEMENT	125	Q1
131	Brink, Tove	SME Routes For Innovation Collaboration With Larger Enterprises	2017	INDUSTRIAL MARKETING MANAGEMENT	125	Q1
132	Bhalla, A; Terjesen, S	Cannot Make Do Without You: Outsourcing By Knowledge-Intensive New Firms In Supplier Networks	2013	INDUSTRIAL MARKETING MANAGEMENT	125	Q1
133	Bond, EU; Houston, MB; Tang, YH	Establishing A High-Technology Knowledge Transfer Network: The Practical And Symbolic Roles Of Identification	2008	INDUSTRIAL MARKETING MANAGEMENT	125	Q1
134	Atuahene-Gima, K; Li, HY; de Luca, LM	The Contingent Value Of Marketing Strategy Innovativeness For Product Development Performance In Chinese New Technology Ventures	2006	INDUSTRIAL MARKETING MANAGEMENT	125	Q1
135	Baroncelli A., Landoni M.	Imitation And Entrepreneurial Learning: Insights From Academic Spin-Offs	2019	INDUSTRY AND HIGHER EDUCATION	21	Q2
136	Scanlan J.	A Capability Maturity Framework For Knowledge Transfer	2018	INDUSTRY AND HIGHER EDUCATION	21	Q2
137	Lynskey M.J.	R&D Investment In New Technology-Based Firms: Strategic And Entrepreneurial Dynamics And The Impact Of Universities	2016	INDUSTRY AND HIGHER EDUCATION	21	Q2
138	Saukkonen J., Nukari J., Ballard S., Levie J.	Start-Up Entrepreneurs And University Students In A Co-Learning Mode: Learning Effects Of A Collaborative Entrepreneurial Coaching Programme	2016	INDUSTRY AND HIGHER EDUCATION	21	Q2

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140	Rae D.	Achieving Business Focus: Promoting The Entrepreneurial Management Capabilities Of Owner-Managers	2007	INDUSTRY AND HIGHER EDUCATION	21	Q2
141	Parida, Vinit;Wincent, Joakim;Kohtamaeki, Marko	Offshoring And Improvisational Learning: Empirical Insights Into Developing Global R&Amp;D Capabilities	2013	INDUSTRY AND INNOVATION	57	Q1
142	Cho, M; Bonn, MA; Han, SJ	Innovation Ambidexterity: Balancing Exploitation And Exploration For Startup And Established Restaurants And Impacts Upon Performance	2020	INDUSTRY AND INNOVATION	57	Q1
143	Lin, CJ; Li, CR	The Effect Of Boundary-Spanning Search On Breakthrough Innovations Of New Technology Ventures	2013	INDUSTRY AND INNOVATION	57	Q1
144	Yang, CH; Lin, HL; Li, HY	Do RD Spinoffs Have Higher RD Productivity? Evidence From Taiwanese Electronics Firms	2010	INDUSTRY AND INNOVATION	57	Q1
145	Lindgren, Eveliina	Raising The Odds Of Success: The Current State Of Experimentation In Product Development	2016	INFORMATION AND SOFTWARE TECHNOLOGY	95	Q1
146	Chouseinoglou, Oumout	Aiolos: A Model For Assessing Organizational Learning In Software Development Organizations	2013	INFORMATION AND SOFTWARE TECHNOLOGY	95	Q1
147	Matthews, M	Capability Building And Risk Management In Commercialisation: Lessons From The Radiata Experiments	2007	INNOVATION-MANAGEMENT POLICY & PRACTICE	27	Q1
148	Yang, SC; Tu, CY	Capital And New Product Quality In High-Tech Startups-An Examination In Two Environmental Contexts	Ahead	INNOVATION-ORGANIZATION & MANAGEMENT	27	Q1
149	Bicen, P; Johnson, WHA	How Do Firms Innovate With Limited Resources In Turbulent Markets?	2014	INNOVATION-ORGANIZATION & MANAGEMENT	27	Q1
150	Braunerhjelm, P; Halldin, T	Born Globals - Presence, Performance And Prospects	2019	INTERNATIONAL BUSINESS REVIEW	87	Q1
151	Choquette, E; Rask, M; Sala, D; Schroder, P	Born Globals-Is There Fire Behind The Smoke?	2017	INTERNATIONAL BUSINESS REVIEW	87	Q1
152	Hollender, L; Zapkau, FB; Schwens, C	SME Foreign Market Entry Mode Choice And Foreign Venture Performance: The Moderating Effect Of International Experience And Product Adaptation	2017	INTERNATIONAL BUSINESS REVIEW	87	Q1

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154	Drogendijk, R; Andersson, U	Relationship Development in Greenfield Expansions	2013	INTERNATIONAL BUSINESS REVIEW	87	Q1
155	Presutti, M; Boari, C; Fratocchi, L	Knowledge Acquisition and The Foreign Development of High-Tech Start-Ups: A Social Capital Approach	2007	INTERNATIONAL BUSINESS REVIEW	87	Q1
156	Sansone, G; Battaglia, D; Landoni, P; Paolucci, E	Academic Spinoffs: The Role of Entrepreneurship Education	Ahead	INTERNATIONAL ENTREPRENEURSHIP AND MANAGEMENT JOURNAL	50	Q1
157	Wang, DJ; Schott, T	Coupling Between Financing and Innovation In A Startup: Embedded In Networks With Investors And Researchers	Ahead	INTERNATIONAL ENTREPRENEURSHIP AND MANAGEMENT JOURNAL	50	Q1
158	Garcia-Cabrera, AM; Garcia-Soto, MG; Nieves, J	Knowledge, Innovation and NTBF Short- And Long-Term Performance	Ahead	INTERNATIONAL ENTREPRENEURSHIP AND MANAGEMENT JOURNAL	50	Q1
159	Segui-Mas, E; Oltra, V; Tormo-Carbo, G; Sarrion-Vines, F	Rowing Against the Wind: How Do Times Of Austerity Shape Academic Entrepreneurship In Unfriendly Environments?	2018	INTERNATIONAL ENTREPRENEURSHIP AND MANAGEMENT JOURNAL	50	Q1
160	Laurell, H; Achtenhagen, L; Andersson, S	The Changing Role of Network Ties And Critical Capabilities In An International New Venture's Early Development	2017	INTERNATIONAL ENTREPRENEURSHIP AND MANAGEMENT JOURNAL	50	Q1
161	Welsh, DHB; Kaciak, E; Minialai, C	The Influence Of Perceived Management Skills And Perceived Gender Discrimination In Launch Decisions By Women Entrepreneurs	2017	INTERNATIONAL ENTREPRENEURSHIP AND MANAGEMENT JOURNAL	50	Q1
162	Munari, F; Toschi, L	Do Patents Affect VC Financing? Empirical Evidence From The Nanotechnology Sector	2015	INTERNATIONAL ENTREPRENEURSHIP AND MANAGEMENT JOURNAL	50	Q1

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163	Masango, S; Marinova, S	Knowledge-Based Network Ties In Early Rapidly Internationalising Small Firms: A Missing Link?	2014	INTERNATIONAL ENTREPRENEURSHIP AND MANAGEMENT JOURNAL	50	Q1
164	Sarkar P., Yamarte L., Rho H., Johanson L.	Anode-Supported Tubular Micro-Solid Oxide Fuel Cell	2007	INTERNATIONAL JOURNAL OF APPLIED CERAMIC TECHNOLOGY	53	Q2
165	Čirjevskis A.	Exploration Of Qualitative Success Factors Of Innovative E-Business Startups: Blue Ocean Strategy Versus Dynamic Capabilities	2017	INTERNATIONAL JOURNAL OF BUSINESS EXCELLENCE	16	Q2
166	Lewrick M., Raeside R.	Transformation And Change Process In Innovation Models: Start-Up And Mature Companies	2010	INTERNATIONAL JOURNAL OF BUSINESS INNOVATION AND RESEARCH	19	Q3
167	Ekanem I., Wyer P.	A Fresh Start And The Learning Experience Of Ethnic Minority Entrepreneurs	2007	INTERNATIONAL JOURNAL OF CONSUMER STUDIES	64	Q2
168	Verma Y.P., Kumar A.	Economic-Emission Unit Commitment Solution For Wind Integrated Hybrid System	2011	INTERNATIONAL JOURNAL OF ENERGY SECTOR MANAGEMENT	19	Q3
169	Seo, YW; Lee, YH	Effects Of Internal And External Factors On Business Performance Of Start-Ups In South Korea: The Engine Of New Market Dynamics	2019	INTERNATIONAL JOURNAL OF ENGINEERING BUSINESS MANAGEMENT	18	Q3
170	Tomy, S; Pardede, E	An Entrepreneurial Intention Model Focussing On Higher Education	Ahead	INTERNATIONAL JOURNAL OF ENTREPRENEURIAL BEHAVIOR & RESEARCH	62	Q1
171	Mawson, S; Kasem, L	Exploring The Entrepreneurial Intentions Of Syrian Refugees In The UK	2019	INTERNATIONAL JOURNAL OF ENTREPRENEURIAL BEHAVIOR & RESEARCH	62	Q1
172	Arte, P	Role Of Experience And Knowledge In Early Internationalisation Of Indian New Ventures A Comparative Case Study	2017	INTERNATIONAL JOURNAL OF ENTREPRENEURIAL BEHAVIOR & RESEARCH	62	Q1

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174	Drnovsek, M; Wincent, J; Cardon, MS	Entrepreneurial Self-Efficacy And Business Start-Up: Developing A Multi-Dimensional Definition	2010	INTERNATIONAL JOURNAL OF ENTREPRENEURIAL BEHAVIOR & RESEARCH	62	Q1
175	Innocenti, N; Zampi, V	What Does A Start-Up Need To Grow? An Empirical Approach For Italian Innovative Start-Ups	2019	INTERNATIONAL JOURNAL OF ENTREPRENEURIAL BEHAVIOUR & RESEARCH	62	Q1
176	Furlan, A	Who Lives Longer? Startups Vs Spinoffs Founded As Proprietorships	2016	INTERNATIONAL JOURNAL OF ENTREPRENEURIAL BEHAVIOUR & RESEARCH	62	Q1
177	Pakura, S	Open Innovation As A Driver For New Organisations: A Qualitative Analysis Of Green-Tech Start-Ups	2020	INTERNATIONAL JOURNAL OF ENTREPRENEURIAL VENTURING	14	Q2
178	Simon, F; Harms, R; Schiele, H	Managing Corporate-Startup Relationships: What Matters For Entrepreneurs?	2019	INTERNATIONAL JOURNAL OF ENTREPRENEURIAL VENTURING	14	Q2
179	Thiele, P; Fellnhofer, K	The Impact Of Pre-Startup Planning On The Strength Of Planning Assumptions And The Mode Of Processing	2015	INTERNATIONAL JOURNAL OF ENTREPRENEURIAL VENTURING	14	Q2
180	Albertini, S; Muzzi, C	Institutional Entrepreneurship And Organizational Innovation: The Start-Up Of A Divergent New Venture At The Periphery Of A Mature Field	2016	INTERNATIONAL JOURNAL OF ENTREPRENEURSHIP AND INNOVATION	14	Q2

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181	Padrão L.C., Andreassi T., Brito L.A.L.	Marketing Capability, Technical Capability Or Degree Of Product Innovation: What Really Matters In Leveraging The Sales Of Technology-Based Start-Ups?	2019	INTERNATIONAL JOURNAL OF ENTREPRENEURSHIP AND INNOVATION MANAGEMENT	22	Q3
182	Werner A.	Do Credit Constraints Matter More For College Dropout Entrepreneurs?	2011	INTERNATIONAL JOURNAL OF ENTREPRENEURSHIP AND INNOVATION MANAGEMENT	22	Q3
183	Kirkeby S., Christensen K.S.	Designing For Innovative Capability In The Structure Of Organisations	2010	INTERNATIONAL JOURNAL OF ENTREPRENEURSHIP AND INNOVATION MANAGEMENT	22	Q3
184	Manimala M.J.	Entrepreneurship Education In India: An Assessment Of SME Training Needs Against Current Practices	2008	INTERNATIONAL JOURNAL OF ENTREPRENEURSHIP AND INNOVATION MANAGEMENT	22	Q3
185	Van Geenhuizen M., Nijkamp P.	Learning Regions In An Evolutionary Context: Policymaking For High Technology Firms	2006	INTERNATIONAL JOURNAL OF ENTREPRENEURSHIP AND INNOVATION MANAGEMENT	22	Q3
186	Andrén L., Magnusson M., Sjölander S.	Opportunistic Adaptation In Start-Up Companies	2003	INTERNATIONAL JOURNAL OF ENTREPRENEURSHIP AND INNOVATION MANAGEMENT	22	Q3
187	Siew T.F., Allampalli D.G.	Enterprise 50: Successful Growing Enterprises (Sges) Of Singapore: An Exploratory Study Of Success Factors	2001	INTERNATIONAL JOURNAL OF ENTREPRENEURSHIP AND INNOVATION MANAGEMENT	22	Q3

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188	Brandão M., Do Canto Cavalheiro G.M., Joia L.A.	Examining A Brazilian Internet Start-Up From A Knowing Organisation Perspective: The Case Of Cuponeria	2018	INTERNATIONAL JOURNAL OF ENTREPRENEURSHIP AND SMALL BUSINESS	29	Q2
189	Richstein R., Lins E.	Venture Capital For German High-Tech New Ventures: Disentangling The Role Of Human Capital For Funding Success	2018	INTERNATIONAL JOURNAL OF ENTREPRENEURSHIP AND SMALL BUSINESS	29	Q2
190	Van Der Steen M., Englis P.D., Meyer P.B.	The Impact Of Knowledge Capabilities On Corporate Venturing	2013	INTERNATIONAL JOURNAL OF ENTREPRENEURSHIP AND SMALL BUSINESS	29	Q2
191	Piller F.T.	Mass Customization: Reflections On The State Of The Concept	2004	INTERNATIONAL JOURNAL OF FLEXIBLE MANUFACTURING SYSTEMS	-	-
192	Sun, SQ; Tao, QY	The Relationship Between Technological Innovation Ability, Atmosphere And Innovation Performance	2020	INTERNATIONAL JOURNAL OF INFORMATION SYSTEMS AND SUPPLY CHAIN MANAGEMENT	13	Q2
193	Baaziz, A	Towards New Paradigm Of Coopetitiveness In Emerging Countries: Case Of The Algerian Entrepreneurial Ecosystems	2019	INTERNATIONAL JOURNAL OF INNOVATION	-	-
194	Poponi, S; Braccini, AM; Ruggieri, A	Key Success Factors Positively Affecting Organizational Performance Of Academic Spin-Offs	2017	INTERNATIONAL JOURNAL OF INNOVATION AND TECHNOLOGY MANAGEMENT	17	Q3
195	Rao, B; Mulloth, B	The Role Of Universities In Encouraging Growth Of Technology-Based New Ventures	2017	INTERNATIONAL JOURNAL OF INNOVATION AND TECHNOLOGY MANAGEMENT	17	Q3

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196	Vliet, B	A Behavioural Approach To The Lean Startup/Minimum Viable Product Process: The Case Of Algorithmic Financial Systems	2020	INTERNATIONAL JOURNAL OF INNOVATION MANAGEMENT	39	Q2
197	Acosta-Prado J.C., Navarrete J.F.F., Tafur-Mendoza A.A.	RELATIONSHIP Between CONDITIONS Of KNOWLEDGE MANAGEMENT And INNOVATION CAPABILITY In NEW TECHNOLOGY-BASED FIRMS	2020	INTERNATIONAL JOURNAL OF INNOVATION MANAGEMENT	39	Q2
198	Rydehell, H; Isaksson, A; Lofsten, H	Effects Of Internal And External Resource Dimensions On The Business Performance Of New Technology-Based Firms	2019	INTERNATIONAL JOURNAL OF INNOVATION MANAGEMENT	39	Q2
199	Huynh, T	What Makes External Financial Supporters Engage In University Spin-Off Seed Investments: Entrepreneurs' Capabilities Or Social Networks?	2019	INTERNATIONAL JOURNAL OF INNOVATION MANAGEMENT	39	Q2
200	Bock, C; Landau, C; Orendt, M; Schmidt, M	Are Public Financing Schemes Beneficial For University Spin-Offs And The Technology Transfer Of Innovations?	2018	INTERNATIONAL JOURNAL OF INNOVATION MANAGEMENT	39	Q2
201	Ibeku, S	Organisational Learning, Innovation And Performance Of Technology Start-Ups In Lagos, Nigeria	2018	INTERNATIONAL JOURNAL OF INNOVATION MANAGEMENT	39	Q2
202	Homfeldt, F; Rese, A; Brenner, H; Baier, D; Schaefer, TF	Identification And Generation Of Innovative Ideas In The Procurement Of The Automotive Industry: The Case Of Audi Ag	2017	INTERNATIONAL JOURNAL OF INNOVATION MANAGEMENT	39	Q2
203	Williams, C; Colovic, A; Zhu, JQ	Foreign Market Knowledge, Country Sales Breadth And Innovative Performance Of Emerging Economy Firms	2016	INTERNATIONAL JOURNAL OF INNOVATION MANAGEMENT	39	Q2
204	Hyvönen S., Tuominen M.	Entrepreneurial Innovation, Market-Driven Intangibles And Learning Orientation: Critical Indicators For Performance Advantages In Smes	2006	INTERNATIONAL JOURNAL OF MANAGEMENT AND DECISION MAKING	23	Q3

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206	Lin, BW; Hung, SC; Li, PC	Mergers And Acquisitions As A Human Resource Strategy - Evidence From US Banking Firms	2006	INTERNATIONAL JOURNAL OF MANPOWER	54	Q2
207	Awad, TA; Fatah, SMA	The Impact Of Social Media Branding On Developing Brand Advocates For Start-Ups	2015	INTERNATIONAL JOURNAL OF ONLINE MARKETING	-	-
208	Tolonen, A; Haapasalo, H; Harkonen, J; Verrollot, J	Supply Chain Capability Creation - The Creation Of The Supply Chain Readiness For A New Product During Product Development Process	2017	INTERNATIONAL JOURNAL OF PRODUCTION ECONOMICS	172	Q1
209	Yoon, J; Rosales, C; Talluri, S	Inter-Firm Partnerships - Strategic Alliances In The Pharmaceutical Industry	2018	INTERNATIONAL JOURNAL OF PRODUCTION RESEARCH	125	Q1
210	Zimmer, LS; Montgomery, DC; Runger, GC	Evaluation Of A Three-State Adaptive Sample Size (X)Over-Bar Control Chart	1998	INTERNATIONAL JOURNAL OF PRODUCTION RESEARCH	125	Q1
211	Bianchi, C; Winch, G; Cosenz, F	Experimenting Lean Dynamic Performance Management Systems Design In Smes	2018	INTERNATIONAL JOURNAL OF PRODUCTIVITY AND PERFORMANCE MANAGEMENT	54	Q1
212	Camargo, LR; Pereira, SCF; Scarpin, MRS	Fast And Ultra-Fast Fashion Supply Chain Management: An Exploratory Research	2020	INTERNATIONAL JOURNAL OF RETAIL & DISTRIBUTION MANAGEMENT	73	Q1
213	Waldner F., Zsifkovits M., Heidenberger K.	Are Service-Based Business Models Of The Video Game Industry Blueprints For The Music Industry?	2013	INTERNATIONAL JOURNAL OF SERVICES, ECONOMICS AND MANAGEMENT	9	Q4

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214	Macleod G., McFarlane B., Davis C.H.	The Knowledge Economy and The Social Economy: University Support for Community Enterprise Development As A Strategy For Economic Regeneration In Distressed Regions In Canada And Mexico	1997	INTERNATIONAL JOURNAL OF SOCIAL ECONOMICS	37	Q2
215	Roininen, Sari	Start-Ups' Achievement of Competitive Advantages Through Network Relations	2008	INTERNATIONAL JOURNAL OF TECHNOENTREPRENEU RSHIP	7	Q4
216	Oppong-Tawiah D., Chan Y.E.	The Influence of IT And Knowledge Capabilities on The Survival Of University IT Startups	2016	INTERNATIONAL JOURNAL OF TECHNOENTREPRENEU RSHIP	7	Q4
217	Banerjee P.M.	Financing As Mother's Milk for International Biotechnology Start-Ups	2009	INTERNATIONAL JOURNAL OF TECHNOENTREPRENEU RSHIP	7	Q4
218	Kirs, Margit	Expansion Of Science-Based Industries: Technological and Organisational Accumulation Vs. Fragmentation? Insights From Biotechnology in Estonia	2017	INTERNATIONAL JOURNAL OF TECHNOLOGICAL LEARNING, INNOVATION AND DEVELOPMENT	20	Q3
219	Aeron P., Jain R.	A Study on Technological Capability Among Product-Based Telecom Start-Ups In India: Role Of Technological Learning And Bricolage	2015	INTERNATIONAL JOURNAL OF TECHNOLOGICAL LEARNING, INNOVATION AND DEVELOPMENT	20	Q3
220	Sturgeon T.J., Kawakami M.	Global Value Chains in The Electronics Industry: Characteristics, Crisis, And Upgrading Opportunities For Firms From Developing Countries	2011	INTERNATIONAL JOURNAL OF TECHNOLOGICAL LEARNING, INNOVATION AND DEVELOPMENT	20	Q3
221	Diez-Vial, I; Montoro-Sanchez, A	From Incubation To Maturity Inside Parks: The Evolution Of Local Knowledge Networks	2017	INTERNATIONAL JOURNAL OF TECHNOLOGY MANAGEMENT	54	Q1

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222	Cahen, FR; Oliveira, MD; Borini, FM	The Internationalisation Of New Technology-Based Firms From Emerging Markets	2017	INTERNATIONAL JOURNAL OF TECHNOLOGY MANAGEMENT	54	Q1
223	Teubal, M; Avnimelech, G	Foreign Acquisitions And R&D Leverage In High Tech Industries Of Peripheral Economies. Lessons And Policy Issues From The Israeli Experiences	2003	INTERNATIONAL JOURNAL OF TECHNOLOGY MANAGEMENT	54	Q1
224	Blesa, A; Ripolles, M	The Influence Of Marketing Capabilities On Economic International Performance	2008	INTERNATIONAL MARKETING REVIEW	83	Q1
225	Yeoh, PL	International Learning: Antecedents And Performance Implications Among Newly Internationalizing Companies In An Exporting Context	2004	INTERNATIONAL MARKETING REVIEW	83	Q1
226	Zhou, Z; Verburg, R	Open For Business: The Impact Of Creative Team Environment And Innovative Behaviour In Technology-Based Start-Ups	2020	INTERNATIONAL SMALL BUSINESS JOURNAL-RESEARCHING ENTREPRENEURSHIP	78	Q1
227	O'Cass, A; Sok, P	The Role Of Intellectual Resources, Product Innovation Capability, Reputational Resources And Marketing Capability Combinations In Firm Growth	2014	INTERNATIONAL SMALL BUSINESS JOURNAL-RESEARCHING ENTREPRENEURSHIP	78	Q1
228	Gao, SS; Sung, MC; Zhang, J	Risk Management Capability Building In Smes: A Social Capital Perspective	2013	INTERNATIONAL SMALL BUSINESS JOURNAL-RESEARCHING ENTREPRENEURSHIP	78	Q1
229	Delerue, H; Lejeune, A	Internationalization Of Biotechnology Start-Ups: Geographic Location And Mimetic Behaviour	2012	INTERNATIONAL SMALL BUSINESS JOURNAL-RESEARCHING ENTREPRENEURSHIP	78	Q1
230	Westhead, P; Ucbasaran, D; Wright, M	Information Search And Opportunity Identification The Importance Of Prior Business Ownership Experience	2009	INTERNATIONAL SMALL BUSINESS JOURNAL-RESEARCHING ENTREPRENEURSHIP	78	Q1
231	Groen, AJ; Wakkee, IAM; De Weerd-Nederhof, PC	Managing Tensions In A High-Tech Start-Up - An Innovation Journey In Social System Perspective	2008	INTERNATIONAL SMALL BUSINESS JOURNAL-RESEARCHING ENTREPRENEURSHIP	78	Q1

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232	Au, CH; Tan, BN; Sun, Y	Developing A P2P Lending Platform: Stages, Strategies And Platform Configurations	2020	INTERNET RESEARCH	80	Q1
233	Khursheed, A; Mustafa, F; Fatima, M; Khalid, F	Antecedents Of Entrepreneurial Intentions: A Cross-Country Study Of Northern Europe And The Danube Region	2019	IRANIAN JOURNAL OF MANAGEMENT STUDIES	-	-
234	Hasenpusch T.C., Baumann S.	Strategic Media Venturing: Corporate Venture Capital Approaches Of TIME Incumbents	2017	JMM INTERNATIONAL JOURNAL ON MEDIA MANAGEMENT	18	Q2
235	Mostafiz, I; Goh, SK	International Women Entrepreneurs And International Opportunity Recognition Skills For Start-Up Ventures	2018	JOURNAL FOR INTERNATIONAL BUSINESS AND ENTREPRENEURSHIP DEVELOPMENT	2	Q4
236	Niammuad D., Napompech K., Suwanmaneepong S.	Entrepreneurial Product Innovation: A Second-Order Factor Analysis	2014	JOURNAL OF APPLIED BUSINESS RESEARCH	20	Q3
237	Hou, BJ; Hong, J; Zhu, RN	Exploration/Exploitation Innovation And Firm Performance: The Mediation Of Entrepreneurial Orientation And Moderation Of Competitive Intensity	2019	JOURNAL OF ASIA BUSINESS STUDIES	13	Q2
238	Yi, HT; Han, CN; Cha, YB	The Effect Of Entrepreneurship Of Smes On Corporate Capabilities, Dynamic Capability And Technical Performances In South Korea	2018	JOURNAL OF ASIAN FINANCE, ECONOMICS AND BUSINESS	3	Q3
239	Salehi, F; Zolkiewski, J; Perks, H; Bahreini, MA	Exploration Of Capability And Role Development In An Emerging Technology Network	2018	JOURNAL OF BUSINESS & INDUSTRIAL MARKETING	62	Q1
240	Faroque, AR; Morrish, SC; Ferdous, AS	Networking, Business Process Innovativeness And Export Performance: The Case Of South Asian Low-Tech Industry	2017	JOURNAL OF BUSINESS & INDUSTRIAL MARKETING	62	Q1
241	Canning, L; Szmigin, I	Radical Innovation, Network Competence And The Business Of Body Disposal	2016	JOURNAL OF BUSINESS & INDUSTRIAL MARKETING	62	Q1
242	Crispeels, T; Willems, J; Brugman, P	The Relationship Between Organizational Characteristics And Membership Of A Biotechnology Industry Board-Of-Directors-Network	2015	JOURNAL OF BUSINESS & INDUSTRIAL MARKETING	62	Q1
243	Kim, J; Choi, H	Value Co-Creation Through Social Media: A Case Study Of A Start-Up Company	2019	JOURNAL OF BUSINESS ECONOMICS AND MANAGEMENT	33	Q2

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244	Ahsan, M	Entrepreneurship And Ethics In The Sharing Economy: A Critical Perspective	2020	JOURNAL OF BUSINESS ETHICS	168	Q1
245	Park, G; Shin, SR; Choy, M	Early Mover (Dis)Advantages And Knowledge Spillover Effects On Blockchain Startups' Funding And Innovation Performance	2020	JOURNAL OF BUSINESS RESEARCH	179	Q1
246	Randhawa K., Wilden R., Gudergan S.	How To Innovate Toward An Ambidextrous Business Model? The Role Of Dynamic Capabilities And Market Orientation	2020	JOURNAL OF BUSINESS RESEARCH	179	Q1
247	Bustamante, CV	Strategic Choices: Accelerated Startups' Outsourcing Decisions	2019	JOURNAL OF BUSINESS RESEARCH	179	Q1
248	To, CKM; Au, JSC; Kan, CW	Uncovering Business Model Innovation Contexts: A Comparative Analysis By Fsqca Methods	2019	JOURNAL OF BUSINESS RESEARCH	179	Q1
249	Beynon, MJ; Jones, P; Pickernell, D	Entrepreneurial Climate And Self-Perceptions About Entrepreneurship: A Country Comparison Using Fsqca With Dual Outcomes	2018	JOURNAL OF BUSINESS RESEARCH	179	Q1
250	Morgan, T; Anokhin, S; Wincent, J	When The Fog Dissipates: The Choice Between Value Creation And Value Appropriation In A Partner As A Function Of Information Asymmetry	2018	JOURNAL OF BUSINESS RESEARCH	179	Q1
251	Huynh, T; Patton, D; Arias-Aranda, D; Molina-Fernandez, LM	University Spin-Off S Performance: Capabilities And Networks Of Founding Teams At Creation Phase	2017	JOURNAL OF BUSINESS RESEARCH	179	Q1
252	Cahen, FR; Lahiri, S; Borini, FM	Managerial Perceptions Of Barriers To Internationalization: An Examination Of Brazil's New Technology-Based Firms	2016	JOURNAL OF BUSINESS RESEARCH	179	Q1
253	Berbegal-Mirabent, J; Ribeiro-Soriano, DE; Garcia, JLS	Can A Magic Recipe Foster University Spin-Off Creation?	2015	JOURNAL OF BUSINESS RESEARCH	179	Q1
254	Lai, WH; Lin, CC	Constructing Business Incubation Service Capabilities For Tenants At Post-Entrepreneurial Phase	2015	JOURNAL OF BUSINESS RESEARCH	179	Q1
255	Ahmadi, H; O'Cass, A; Miles, MP	Product Resource-Capability Complementarity, Integration Mechanisms, And First Product Advantage	2014	JOURNAL OF BUSINESS RESEARCH	179	Q1
256	Yague-Perales, RM; March-Chorda, I	Performance Analysis Of Research Spin-Offs In The Spanish Biotechnology Industry	2012	JOURNAL OF BUSINESS RESEARCH	179	Q1
257	Wang, CJ; Wu, LY	Team Member Commitments And Start-Up Competitiveness	2012	JOURNAL OF BUSINESS RESEARCH	179	Q1
258	Wu, LY	Entrepreneurial Resources, Dynamic Capabilities And Start-Up Performance Of Taiwan's High-Tech Firms	2007	JOURNAL OF BUSINESS RESEARCH	179	Q1

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260	Hyytinen, A; Pajarinen, M; Rouvinen, P	Does Innovativeness Reduce Startup Survival Rates?	2015	JOURNAL OF BUSINESS VENTURING	170	Q1
261	Pe'er, A; Keil, T	Are All Startups Affected Similarly By Clusters? Agglomeration, Competition, Firm Heterogeneity, And Survival	2013	JOURNAL OF BUSINESS VENTURING	170	Q1
262	Newbert, SL; Tornikoski, ET; Quigley, NR	Exploring The Evolution Of Supporter Networks In The Creation Of New Organizations	2013	JOURNAL OF BUSINESS VENTURING	170	Q1
263	Colombo, MG; Grilli, L	On Growth Drivers Of High-Tech Start-Ups: Exploring The Role Of Founders' Human Capital And Venture Capital	2010	JOURNAL OF BUSINESS VENTURING	170	Q1
264	Carpentier, C; L'Her, JF; Suret, JM	Stock Exchange Markets For New Ventures	2010	JOURNAL OF BUSINESS VENTURING	170	Q1
265	Zheng, YF; Liu, J; George, G	The Dynamic Impact Of Innovative Capability And Inter-Firm Network On Firm Valuation: A Longitudinal Study Of Biotechnology Start-Ups	2010	JOURNAL OF BUSINESS VENTURING	170	Q1
266	Brush, CG; Manolova, TS; Edelman, LF	Properties Of Emerging Organizations: An Empirical Test	2008	JOURNAL OF BUSINESS VENTURING	170	Q1
267	Janney, JJ; Dess, GG	The Risk Concept For Entrepreneurs Reconsidered: New Challenges To The Conventional Wisdom	2006	JOURNAL OF BUSINESS VENTURING	170	Q1
268	Man, TWY; Lau, T; Chan, KF	The Competitiveness Of Small And Medium Enterprises - A Conceptualization With Focus On Entrepreneurial Competencies	2002	JOURNAL OF BUSINESS VENTURING	170	Q1
269	Brush, CG; Chaganti, R	Businesses Without Glamour? An Analysis Of Resources On Performance By Size And Age In Small Service And Retail Firms	1999	JOURNAL OF BUSINESS VENTURING	170	Q1
270	Thakur, SP	Size Of Investment, Opportunity Choice And Human Resources In New Venture Growth: Some Typologies	1999	JOURNAL OF BUSINESS VENTURING	170	Q1
271	Carter, NM; Williams, M; Reynolds, PD	Discontinuance Among New Firms In Retail: The Influence Of Initial Resources, Strategy, And Gender	1997	JOURNAL OF BUSINESS VENTURING	170	Q1
272	Brush C., Ali A., Kelley D., Greene P.	The Influence Of Human Capital Factors And Context On Women's Entrepreneurship: Which Matters More?	2017	JOURNAL OF BUSINESS VENTURING INSIGHTS	14	Q1
273	Guercini, S; Milanesi, M	Interaction Approach And Liabilities: A Case Analysis Of Start-Up Firms	2016	JOURNAL OF BUSINESS-TO-BUSINESS MARKETING	29	Q3

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274	Gonzalez R.A., Vargas M., Malaver F., Ortiz E.	Structuration And Learning In A Software Firm: A Technology-Based Entrepreneurship Case Study	2019	JOURNAL OF CASES ON INFORMATION TECHNOLOGY	13	Q4
275	Aydin, Nezir	Designing Reverse Logistics Network Of End-Of-Life-Buildings As Preparedness To Disasters Under Uncertainty	2020	JOURNAL OF CLEANER PRODUCTION	173	Q1
276	Orsini, Federico	Approaches For A Low-Carbon Production Of Building Materials: A Review	2019	JOURNAL OF CLEANER PRODUCTION	173	Q1
277	Guyader H., Piscicelli L.	Business Model Diversification In The Sharing Economy: The Case Of Gomore	2019	JOURNAL OF CLEANER PRODUCTION	173	Q1
278	Burger C., Kalverkamp M., Pehlken A.	Decision Making And Software Solutions With Regard To Waste Management	2018	JOURNAL OF CLEANER PRODUCTION	173	Q1
279	Weissbrod I., Bocken N.M.P.	Developing Sustainable Business Experimentation Capability – A Case Study	2017	JOURNAL OF CLEANER PRODUCTION	173	Q1
280	Jun D.H., El-Rayes K.	Multiobjective Optimization Of Resource Leveling And Allocation During Construction Scheduling	2011	JOURNAL OF CONSTRUCTION ENGINEERING AND MANAGEMENT	105	Q1
281	Akinyemi, F; Ojah, K	Transition Probabilities Between Entrepreneurship Phases In Africa's Emerging Economies: The Case Of Nigeria And South Africa	2018	JOURNAL OF DEVELOPMENTAL ENTREPRENEURSHIP	23	Q3
282	Barnir A.	Gender Differentials In Antecedents Of Habitual Entrepreneurship: Impetus Factors And Human Capital	2014	JOURNAL OF DEVELOPMENTAL ENTREPRENEURSHIP	23	Q3
283	Diochon M., Menzies T.V., Gasse Y.	Exploring The Nature And Impact Of Gestation-Specific Human Capital Among Nascent Entrepreneurs	2008	JOURNAL OF DEVELOPMENTAL ENTREPRENEURSHIP	23	Q3
284	Varma, S; Nayyar, R; Bansal, V	What Drives Precocity? A Study Of Indian Technology-Intensive Firms	2016	JOURNAL OF EAST-WEST BUSINESS	16	Q3
285	Costanza, F	Stimulating New Business Creation Through System Dynamics Education	2019	JOURNAL OF ECONOMIC AND ADMINISTRATIVE SCIENCES	-	-
286	Lee, HS	Peer Networks In Venture Capital	2017	JOURNAL OF EMPIRICAL FINANCE	69	Q1

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287	Feng, Nanping;Fu, Chao;Wei, Fenfen;Peng, Zhanglin;Zhang, Qiang;Zhang, Kevin H	The Key Role Of Dynamic Capabilities In The Evolutionary Process For A Startup To Develop Into An Innovation Ecosystem Leader: An Indepth Case Study: JET-M	2019	JOURNAL OF ENGINEERING AND TECHNOLOGY MANAGEMENT - JET-M	62	Q1
288	Patzelt, H	CEO Human Capital, Top Management Teams, And The Acquisition Of Venture Capital In New Technology Ventures: An Empirical Analysis	2010	JOURNAL OF ENGINEERING AND TECHNOLOGY MANAGEMENT - JET-M	62	Q1
289	Nosella, A; Petroni, G; Verbano, C	Innovation Development In Biopharmaceutical Start-Up Firms: An Italian Case Study	2006	JOURNAL OF ENGINEERING AND TECHNOLOGY MANAGEMENT - JET-M	62	Q1
290	Deeds, DL	The Role Of R&D Intensity, Technical Development And Absorptive Capacity In Creating Entrepreneurial Wealth In High Technology Start-Ups	2001	JOURNAL OF ENGINEERING AND TECHNOLOGY MANAGEMENT - JET-M	62	Q1
291	Velt, H; Torkkeli, L; Saarenketo, S	The Entrepreneurial Ecosystem And Born Globals: The Estonian Context	2018	JOURNAL OF ENTERPRISING COMMUNITIES-PEOPLE AND PLACES IN THE GLOBAL ECONOMY	22	Q2
292	Bastian, BL; Tucci, CL	Entrepreneurial Advice Sources And Their Antecedents Venture Stage, Innovativeness And Internationalization	2017	JOURNAL OF ENTERPRISING COMMUNITIES-PEOPLE AND PLACES IN THE GLOBAL ECONOMY	22	Q2
293	Roundy, PT; Fayard, D	Dynamic Capabilities And Entrepreneurial Ecosystems: The Micro-Foundations Of Regional Entrepreneurship	2019	JOURNAL OF ENTREPRENEURSHIP	15	Q2
294	Manimala, MJ; Thomas, P; Thomas, PK	Perception Of Entrepreneurial Ecosystem: Testing The Actor-Observer Bias	2019	JOURNAL OF ENTREPRENEURSHIP	15	Q2
295	Yan, J; Yan, L	Collective Entrepreneurship, Environmental Uncertainty And Small Business Performance: A Contingent Examination	2017	JOURNAL OF ENTREPRENEURSHIP	15	Q2
296	Yun, JJ; Won, D; Park, K	Entrepreneurial Cyclical Dynamics Of Open Innovation	2018	JOURNAL OF EVOLUTIONARY ECONOMICS	69	Q1

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298	Aldrich, HE; Yang, TT	How Do Entrepreneurs Know What To Do? Learning And Organizing In New Ventures	2014	JOURNAL OF EVOLUTIONARY ECONOMICS	69	Q1
299	Konno, Y	An Empirical Analysis Of The Discontinuance Of Business For Startup Contractors And Property Companies In Japan	2015	JOURNAL OF FINANCIAL MANAGEMENT OF PROPERTY AND CONSTRUCTION	19	Q3
300	Tumelero, C; Sbragia, R; Borini, FM; Franco, EC	The Role Of Networks In Technological Capability: A Technology-Based Companies Perspective	2018	JOURNAL OF GLOBAL ENTREPRENEURSHIP RESEARCH	-	-
301	Qureshi, MS; Aziz, N; Mian, SA	How Marketing Capabilities Shape Entrepreneurial Firm's Performance? Evidence From New Technology Based Firms In Turkey	2017	JOURNAL OF GLOBAL ENTREPRENEURSHIP RESEARCH	-	-
302	Wonglimpiyarat J.	The Dynamics Of Financial Innovation System	2011	JOURNAL OF HIGH TECHNOLOGY MANAGEMENT RESEARCH	43	Q2
303	Custodio, MG; Thorogood, A; Yetton, P	24 X 7 @ Full Speed: Accelerated Time To Market	2006	JOURNAL OF INFORMATION TECHNOLOGY	75	Q1
304	Damian, D; Manea, C	Causal Recipes For Turning Fin-Tech Freelancers Into Smart Entrepreneurs	2019	JOURNAL OF INNOVATION AND KNOWLEDGE	15	Q1
305	Caseiro, N; Coelho, A	The Influence Of Business Intelligence Capacity, Network Learning And Innovativeness On Startups Performance	2019	JOURNAL OF INNOVATION AND KNOWLEDGE	15	Q1
306	Barnea, A	Israeli Start-Ups - Especially In Cyber Security: Can A New Model Enhance Their Survival Rate?	2018	JOURNAL OF INTELLIGENCE STUDIES IN BUSINESS	10	Q3
307	Distel, AP; Sofka, W; de Faria, P; Preto, MT; Ribeiro, AS	Dynamic Capabilities For Hire - How Former Host-Country Entrepreneurs As MNC Subsidiary Managers Affect Performance	Ahead	JOURNAL OF INTERNATIONAL BUSINESS STUDIES	184	Q1

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309	Coeurderoy, R; Murray, G	Regulatory Environments And The Location Decision: Evidence From The Early Foreign Market Entries Of New-Technology-Based Firms	2008	JOURNAL OF INTERNATIONAL BUSINESS STUDIES	184	Q1
310	Chen, SFS	The Motives For International Acquisitions: Capability Procurements, Strategic Considerations, And The Role Of Ownership Structures	2008	JOURNAL OF INTERNATIONAL BUSINESS STUDIES	184	Q1
311	Abrahamsson, J; Boter, H; Vanyushyn, V	Business Model Innovation Of International New Ventures: An Empirical Study In A Swedish Context	2019	JOURNAL OF INTERNATIONAL ENTREPRENEURSHIP	41	Q1
312	Romanello, R; Chiarvesio, M	Early Internationalizing Firms: 2004-2018	2019	JOURNAL OF INTERNATIONAL ENTREPRENEURSHIP	41	Q1
313	da Rocha, A; Simoes, VC; de Mello, RC; Carneiro, J	From Global Start-Ups To The Borderless Firm: Why And How To Build A Worldwide Value System	2017	JOURNAL OF INTERNATIONAL ENTREPRENEURSHIP	41	Q1
314	Mikhailova, O; Olsen, PI	Internationalization Of An Academic Invention Through Successive Science-Business Networks: The Case Of TAVI	2016	JOURNAL OF INTERNATIONAL ENTREPRENEURSHIP	41	Q1
315	Stayton, J; Mangematin, V	Startup Time, Innovation And Organizational Emergence: A Study Of USA-Based International Technology Ventures	2016	JOURNAL OF INTERNATIONAL ENTREPRENEURSHIP	41	Q1
316	Turcan R.V., Juho A.	What Happens To International New Ventures Beyond Start-Up: An Exploratory Study	2014	JOURNAL OF INTERNATIONAL ENTREPRENEURSHIP	41	Q1
317	Gray B.J., McNaughton R.	Knowledge, Values And Internationalisation-Introduction To The Special Edition	2010	JOURNAL OF INTERNATIONAL ENTREPRENEURSHIP	41	Q1
318	Burgel, O; Murray, GC	The International Market Entry Choices Of Start-Up Companies In High-Technology Industries	2000	JOURNAL OF INTERNATIONAL MARKETING	82	Q1
319	Potjanajaruwit P.	Competitive Advantage Effects On Firm Performance: A Case Study Of Startups In Thailand	2018	JOURNAL OF INTERNATIONAL STUDIES	15	Q2

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321	Freeman, D; Siegfried, RL	Entrepreneurial Leadership In The Context Of Company Start-Up And Growth	2015	JOURNAL OF LEADERSHIP STUDIES	11	Q3
322	Baumann O., Schmidt J., Stieglitz N.	Effective Search In Rugged Performance Landscapes: A Review And Outlook	2019	JOURNAL OF MANAGEMENT	208	Q1
323	Mendoza-Abarca, KI; Gras, D	The Performance Effects Of Pursuing A Diversification Strategy By Newly Founded Nonprofit Organizations	2019	JOURNAL OF MANAGEMENT	208	Q1
324	Gruber, M; MacMillan, IC; Thompson, JD	From Minds To Markets: How Human Capital Endowments Shape Market Opportunity Identification Of Technology Start-Ups	2012	JOURNAL OF MANAGEMENT	208	Q1
325	Hu, MC; Mathews, JA	Estimating The Innovation Effects Of University-Industry-Government Linkages: The Case Of Taiwan	2009	JOURNAL OF MANAGEMENT AND ORGANIZATION	30	Q2
326	Bratkovic, T; Antoncic, B; Ruzzier, M	Strategic Utilization Of Entrepreneur's Resource-Based Social Capital And Small Firm Growth	2009	JOURNAL OF MANAGEMENT AND ORGANIZATION	30	Q2
327	Ahmadi, M; Baei, F; Hosseini-Amiri, SM; Moarefi, A; Suifan, TS; Sweis, R	Proposing A Model Of Manager's Strategic Intelligence, Organization Development, And Entrepreneurial Behavior In Organizations	Ahead	JOURNAL OF MANAGEMENT DEVELOPMENT	55	Q1
328	Birch, C; Lichy, J; Mulholland, G; Kachour, M	An Enquiry Into Potential Graduate Entrepreneurship Is Higher Education Turning Off The Pipeline Of Graduate Entrepreneurs?	2017	JOURNAL OF MANAGEMENT DEVELOPMENT	55	Q1
329	Yasir, M; Majid, A; Yasir, M	Entrepreneurial Knowledge And Start-Up Behavior In A Turbulent Environment	2017	JOURNAL OF MANAGEMENT DEVELOPMENT	55	Q1
330	Corsi, C; Prencipe, A; Rodriguez-Gulias, MJ; Fernandez-Lopez, S; Rodeiro-Pazos, D	The Effect Of Parent University On Firm Growth: An Analysis Of The Spanish And Italian Usos	2017	JOURNAL OF MANAGEMENT DEVELOPMENT	55	Q1
331	Rasmussen, E; Mosey, S; Wright, M	The Evolution Of Entrepreneurial Competencies: A Longitudinal Study Of University Spin-Off Venture Emergence	2011	JOURNAL OF MANAGEMENT STUDIES	172	Q1
332	Keil, T; Autio, E; George, G	Corporate Venture Capital, Disembodied Experimentation And Capability Development	2008	JOURNAL OF MANAGEMENT STUDIES	172	Q1

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334	Homburg, C; Hahn, A; Bornemann, T; Sandner, P	The Role of Chief Marketing Officers For Venture Capital Funding: Endowing New Ventures With Marketing Legitimacy	2014	JOURNAL OF MARKETING RESEARCH	159	Q1
335	Lee R., Park J.G., Park S.H.	Effects Of System Management On Value Creation And Global Growth In Born Startups: Focusing On Born Startups In Korea	2020	JOURNAL OF OPEN INNOVATION: TECHNOLOGY, MARKET, AND COMPLEXITY	20	Q1
336	Kim H., Park S.-Y., Joh W.-IL.	A Study On Technology Development Performance And Technology Commercialization Performance According To The Technology Development Capability Of Smes Focusing On A Comparative Analysis Of Technology Business Groups	2019	JOURNAL OF OPEN INNOVATION: TECHNOLOGY, MARKET, AND COMPLEXITY	20	Q1
337	Jaspers, F; Prencipe, A; van den Ende, J	Organizing Interindustry Architectural Innovations: Evidence From Mobile Communication Applications	2012	JOURNAL OF PRODUCT INNOVATION MANAGEMENT	135	Q1
338	Breznitz, SM; O'Shea, RP; Allen, TJ	University Commercialization Strategies In The Development Of Regional Bioclusters	2008	JOURNAL OF PRODUCT INNOVATION MANAGEMENT	135	Q1
339	Kim, Y; Heshmati, A	Analysis Of Korean IT Startups' Initial Public Offering And Their Post-IPO Performance	2010	JOURNAL OF PRODUCTIVITY ANALYSIS	73	Q1
340	Duggan M., Blayden R.	Venture Maintainability: A Path To Project Success Why Are Some Projects Less Successful Than Others And What Can We Do To Improve?	2001	JOURNAL OF QUALITY IN MAINTENANCE ENGINEERING	52	Q2
341	Nembhard H.B., Mastrangelo C.M.	Integrated Process Control For Startup Operations	1998	JOURNAL OF QUALITY TECHNOLOGY	80	Q1
342	Moazzez, H; Khargh, MT; Nilforoushan, H; Khorasani, MS	Challenges And Barriers In Finding, Forming And Performing For Network Creation A Case Study Of Collaboration Network In Medical Equipment	Ahead	JOURNAL OF SCIENCE AND TECHNOLOGY POLICY MANAGEMENT	13	Q2
343	Hristov, K	Internet Plus Policy A Study On How China Can Achieve Economic Growth Through The Internet Of Things	2017	JOURNAL OF SCIENCE AND TECHNOLOGY POLICY MANAGEMENT	13	Q2

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344	Ngoasong, MZ	Digital Entrepreneurship In A Resource-Scarce Context: A Focus On Entrepreneurial Digital Competencies	2018	JOURNAL OF SMALL BUSINESS AND ENTERPRISE DEVELOPMENT	61	Q1
345	Hain, DS; Jurowetzki, R	Local Competence Building And International Venture Capital In Low-Income Countries: Exploring Foreign High-Tech Investments In Kenya's Silicon Savanna	2018	JOURNAL OF SMALL BUSINESS AND ENTERPRISE DEVELOPMENT	61	Q1
346	Parry, S; Westhead, P	Linking Relationship Marketing To Social Embeddedness In A Rural Bilingual Context	2017	JOURNAL OF SMALL BUSINESS AND ENTERPRISE DEVELOPMENT	61	Q1
347	Allen, TJ; Gloor, PA; Colladon, AF; Woerner, SL; Raz, O	The Power Of Reciprocal Knowledge Sharing Relationships For Startup Success	2016	JOURNAL OF SMALL BUSINESS AND ENTERPRISE DEVELOPMENT	61	Q1
348	Littunen H., Niittykangas H.	The Rapid Growth Of Young Firms During Various Stages Of Entrepreneurship	2010	JOURNAL OF SMALL BUSINESS AND ENTERPRISE DEVELOPMENT	61	Q1
349	Burger-Helmchen T.	Capabilities In Small High-Tech Firms: A Case Of Plural-Entrepreneurship	2009	JOURNAL OF SMALL BUSINESS AND ENTERPRISE DEVELOPMENT	61	Q1
350	Littunen H.	Birth And Growth In New Metal-Based Manufacturing And Business Service Firms In Finland	2001	JOURNAL OF SMALL BUSINESS AND ENTERPRISE DEVELOPMENT	61	Q1
351	Boissin J.-P., Branchet B., Emin S., Herbert J.I.	Students And Entrepreneurship: A Comparative Study Of France And The United States	2009	JOURNAL OF SMALL BUSINESS AND ENTREPRENEURSHIP	24	Q2
352	LeBrasseur R., Zinger J.T.	Start-Up Survival And Management Capability: A Longitudinal Study Of Micro-Enterprises	2005	JOURNAL OF SMALL BUSINESS AND ENTREPRENEURSHIP	24	Q2
353	Harms R., Schwery M.	Lean Startup: Operationalizing Lean Startup Capability And Testing Its Performance Implications	2020	JOURNAL OF SMALL BUSINESS MANAGEMENT	103	Q1

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354	Marvel, MR; Sullivan, DM; Wolfe, MT	Accelerating Sales In Start-Ups: A Domain Planning, Network Reliance, And Resource Complementary Perspective	2019	JOURNAL OF SMALL BUSINESS MANAGEMENT	103	Q1
355	Rodriguez-Serrano, MA; Martin-Armario, E	Born-Global Smes, Performance, And Dynamic Absorptive Capacity: Evidence From Spanish Firms	2019	JOURNAL OF SMALL BUSINESS MANAGEMENT	103	Q1
356	Lundmark, E; Tayar, M; Qin, K; Bilsland, C	Does Reflection Help Students To Develop Entrepreneurial Capabilities?	2019	JOURNAL OF SMALL BUSINESS MANAGEMENT	103	Q1
357	Garcia-Cabrera, AM; Garcia-Soto, MG; Olivares-Mesa, A	Entrepreneurs' Resources, Technology Strategy, And New Technology-Based Firms' Performance	2019	JOURNAL OF SMALL BUSINESS MANAGEMENT	103	Q1
358	Haase, A; Eberl, P	The Challenges Of Routinizing For Building Resilient Startups	2019	JOURNAL OF SMALL BUSINESS MANAGEMENT	103	Q1
359	Croce, A; Guerini, M; Ughetto, E	Angel Financing And The Performance Of High-Tech Start-Ups	2018	JOURNAL OF SMALL BUSINESS MANAGEMENT	103	Q1
360	Fryges, H; Kohn, K; Ullrich, K	The Interdependence Of R&D Activity And Debt Financing Of Young Firms	2015	JOURNAL OF SMALL BUSINESS MANAGEMENT	103	Q1
361	Lee, H; Kelley, D; Lee, J; Lee, S	SME Survival: The Impact Of Internationalization, Technology Resources, And Alliances	2012	JOURNAL OF SMALL BUSINESS MANAGEMENT	103	Q1
362	Baum, M; Schwens, C; Kabst, R	A Typology Of International New Ventures: Empirical Evidence From High-Technology Industries	2011	JOURNAL OF SMALL BUSINESS MANAGEMENT	103	Q1
363	Hormiga, E; Batista-Canino, RM; Sanchez-Medina, A	The Impact Of Relational Capital On The Success Of New Business Start-Ups	2011	JOURNAL OF SMALL BUSINESS MANAGEMENT	103	Q1
364	Renko, M; Carsrud, A; Brannback, M	The Effect Of A Market Orientation, Entrepreneurial Orientation, And Technological Capability On Innovativeness: A Study Of Young Biotechnology Ventures In The United States And In Scandinavia	2009	JOURNAL OF SMALL BUSINESS MANAGEMENT	103	Q1
365	West, GP; Noel, TW	The Impact Of Knowledge Resources On New Venture Performance	2009	JOURNAL OF SMALL BUSINESS MANAGEMENT	103	Q1

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366	Kelley, DJ; Rice, MP	Leveraging The Value Of Proprietary Technologies	2002	JOURNAL OF SMALL BUSINESS MANAGEMENT	103	Q1
367	Ahmadi, H; O'Cass, A	The Role Of Entrepreneurial Marketing In New Technology Ventures First Product Commercialisation	2016	JOURNAL OF STRATEGIC MARKETING	45	Q2
368	Kurpjuweit, S; Wagner, SM; Choi, TY	Selecting Startups As Suppliers: A Typology Of Supplier Selection Archetypes	Ahead	JOURNAL OF SUPPLY CHAIN MANAGEMENT	86	Q1
369	Lopez Hernandez A.K., Fernandez-Mesa A., Edwards-Schachter M.	Team Collaboration Capabilities As A Factor In Startup Success	2018	JOURNAL OF TECHNOLOGY MANAGEMENT AND INNOVATION	25	Q3
370	Campos H.M., Atondo G.H., Quintero M.R.	Towards A Theory For Strategic Posture In New Technology Based Firms	2014	JOURNAL OF TECHNOLOGY MANAGEMENT AND INNOVATION	25	Q3
371	Bolzani, D; Munari, F; Rasmussen, E; Toschi, L	Technology Transfer Offices As Providers Of Science And Technology Entrepreneurship Education	Ahead	JOURNAL OF TECHNOLOGY TRANSFER	73	Q1
372	Francois, V; Philippart, P	A University Spin-Off Launch Failure: Explanation By The Legitimation Process	2019	JOURNAL OF TECHNOLOGY TRANSFER	73	Q1
373	Rydehell, H; Isaksson, A; Lofsten, H	Business Networks And Localization Effects For New Swedish Technology-Based Firms' Innovation Performance	2019	JOURNAL OF TECHNOLOGY TRANSFER	73	Q1
374	Guerrero, M; Urbano, D; Herrera, F	Innovation Practices In Emerging Economies: Do University Partnerships Matter?	2019	JOURNAL OF TECHNOLOGY TRANSFER	73	Q1
375	Jung, H; Kim, BK	Determinant Factors Of University Spin-Off: The Case Of Korea	2018	JOURNAL OF TECHNOLOGY TRANSFER	73	Q1
376	Bock, C; Huber, A; Jarchow, S	Growth Factors Of Research-Based Spin-Offs And The Role Of Venture Capital Investing	2018	JOURNAL OF TECHNOLOGY TRANSFER	73	Q1
377	Fischer, BB; Schaeffer, PR; Vonortas, NS; Queiroz, S	Quality Comes First: University-Industry Collaboration As A Source Of Academic Entrepreneurship In A Developing Country	2018	JOURNAL OF TECHNOLOGY TRANSFER	73	Q1

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378	Ramirez-Aleson, M; Fernandez-Olmos, M	Unravelling The Effects Of Science Parks On The Innovation Performance Of Ntbfs	2018	JOURNAL OF TECHNOLOGY TRANSFER	73	Q1
379	Li, XB	Exploring The Spatial Heterogeneity Of Entrepreneurship In Chinese Manufacturing Industries	2017	JOURNAL OF TECHNOLOGY TRANSFER	73	Q1
380	Rossi, M; Festa, G; Solima, L; Popa, S	Financing Knowledge-Intensive Enterprises: Evidence From Cvcs In The US	2017	JOURNAL OF TECHNOLOGY TRANSFER	73	Q1
381	Eveleens C.P., van Rijnsoever F.J., Niesten E.M.M.I.	How Network-Based Incubation Helps Start-Up Performance: A Systematic Review Against The Background Of Management Theories	2017	JOURNAL OF TECHNOLOGY TRANSFER	73	Q1
382	Kneller, R	The Beginning Of University Entrepreneurship In Japan: Tlos And Bioventures Lead The Way	2007	JOURNAL OF TECHNOLOGY TRANSFER	73	Q1
383	Klofsten M., Jones-Evans D., Schärberg C.	Growing The Linköping Technopole - A Longitudinal Study Of Triple Helix Development In Sweden	1999	JOURNAL OF TECHNOLOGY TRANSFER	73	Q1
384	Boccardelli P., Magnusson M.G.	Dynamic Capabilities In Early-Phase Entrepreneurship	2006	KNOWLEDGE AND PROCESS MANAGEMENT	41	Q3
385	Bettiol, M; De Marchi, V; Di Maria, E	Developing Capabilities In New Ventures: A Knowledge Management Approach	2016	KNOWLEDGE MANAGEMENT RESEARCH & PRACTICE	34	Q2
386	Horrniga, E; Hancock, C; Valls-Pasola, J	Intellectual Capital And New Ventures: The Entrepreneur's Cognizance Of Company Management	2013	KNOWLEDGE MANAGEMENT RESEARCH & PRACTICE	34	Q2
387	Torres R.L., Hasenclever L.	Technological Capability Building In The Brazilian Pharmaceutical Industry	2016	LATIN AMERICAN BUSINESS REVIEW	13	Q3
388	Quintana-Garcia, C; Benavides-Velasco, CA	Gender Diversity In Top Management Teams And Innovation Capabilities: The Initial Public Offerings Of Biotechnology Firms	2016	LONG RANGE PLANNING	96	Q1
389	Bhagavatula, S; Mudambi, R; Murmann, JP	Innovation And Entrepreneurship In India: An Overview	2019	MANAGEMENT AND ORGANIZATION REVIEW	59	Q1
390	Behl, A	Antecedents To Firm Performance And Competitiveness Using The Lens Of Big Data Analytics: A Cross-Cultural Study	Ahead	MANAGEMENT DECISION	91	Q1

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391	Oliva, FL; Couto, MHG; Santos, RF; Bresciani, S	The Integration Between Knowledge Management And Dynamic Capabilities In Agile Organizations	2019	MANAGEMENT DECISION	91	Q1
392	Hunt, R; Ortiz-Hunt, L	Entrepreneurial Round-Tripping The Benefits Of Newness And Smallness In Multi-Directional Value Creation	2017	MANAGEMENT DECISION	91	Q1
393	Belingheri, P; Leone, MI	Walking Into The Room With IP: Exploring Start-Ups' IP Licensing Strategy	2017	MANAGEMENT DECISION	91	Q1
394	Lofsten, H	Business And Innovation Resources Determinants For The Survival Of New Technology-Based Firms	2016	MANAGEMENT DECISION	91	Q1
395	Loras, J; Vizcaino, J	Is Technical Training An Obstacle To Entrepreneurship?	2013	MANAGEMENT DECISION	91	Q1
396	Wu, LY; Wang, CJ; Tseng, CY; Wu, MC	Founding Team And Start-Up Competitive Advantage	2009	MANAGEMENT DECISION	91	Q1
397	Dikova, D; Brouthers, K	International Establishment Mode Choice: Past, Present And Future	2016	MANAGEMENT INTERNATIONAL REVIEW	53	Q1
398	Hagen, B; Zucchella, A	Born Global Or Born To Run? The Long-Term Growth Of Born Global Firms	2014	MANAGEMENT INTERNATIONAL REVIEW	53	Q1
399	Glaister, AJ; Liu, YP; Sahadev, S; Gomes, E	Externalizing, Internalizing And Fostering Commitment: The Case Of Born-Global Firms In Emerging Economies	2014	MANAGEMENT INTERNATIONAL REVIEW	53	Q1
400	Trudgen, R; Freeman, S	Measuring The Performance Of Born-Global Firms Throughout Their Development Process: The Roles Of Initial Market Selection And Internationalisation Speed	2014	MANAGEMENT INTERNATIONAL REVIEW	53	Q1
401	Mazon, G; Moreira-da-Silva, F; Ferreira, MP; Serra, FR	Knowledge Motives In The Cross-Border Acquisitions A Case Research Of Three Brazilian Multinationals	2017	MANAGEMENT RESEARCH-THE JOURNAL OF THE IBEROAMERICAN ACADEMY OF MANAGEMENT	16	Q3
402	Mostafa, R; Klepper, S	Industrial Development Through Tacit Knowledge Seeding: Evidence From The Bangladesh Garment Industry	2018	MANAGEMENT SCIENCE	237	Q1
403	Lohmann, T; Rebennack, S	Tailored Benders Decomposition For A Long-Term Power Expansion Model With Short-Term Demand Response	2017	MANAGEMENT SCIENCE	237	Q1
404	Marx, M; Gans, JS; Hsu, DH	Dynamic Commercialization Strategies For Disruptive Technologies: Evidence From The Speech Recognition Industry	2014	MANAGEMENT SCIENCE	237	Q1

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406	Arora, A; Nandkumar, A	Cash-Out Or Flameout! Opportunity Cost And Entrepreneurial Strategy: Theory, And Evidence From The Information Security Industry	2011	MANAGEMENT SCIENCE	237	Q1
407	Balasubramanian, N	New Plant Venture Performance Differences Among Incumbent, Diversifying, And Entrepreneurial Firms: The Impact Of Industry Learning Intensity	2011	MANAGEMENT SCIENCE	237	Q1
408	Gruber, M; MacMillan, IC; Thompson, JD	Look Before You Leap: Market Opportunity Identification In Emerging Technology Firms	2008	MANAGEMENT SCIENCE	237	Q1
409	Klepper, S; Sleeper, S	Entry By Spinoffs	2005	MANAGEMENT SCIENCE	237	Q1
410	Cohen Wesley M., Levinthal Daniel A.	Reply To 'Comments On 'Fortune Favors The Prepared Firm''	1997	MANAGEMENT SCIENCE	237	Q1
411	Kee D.M.H., Rahman N.A.	Effects Of Entrepreneurial Orientation On Start-Up Success: A Gender Perspective	2018	MANAGEMENT SCIENCE LETTERS	13	Q2
412	Cavallo, A; Ghezzi, A; Ruales Guzm?n, BV	Driving Internationalization Through Business Model Innovation: Evidences From An Agtech Company	2020	MULTINATIONAL BUSINESS REVIEW	26	Q1
413	Ellery A.A.	Space Exploration Through Self-Replication Technology Compensates For Discounting In Net Present Value Cost-Benefit Analysis: A Business Case?	2017	NEW SPACE	8	Q2
414	Bughin, J	Attack Or Convert?: Early Evidence From European On-Line Banking	2004	OMEGA-INTERNATIONAL JOURNAL OF MANAGEMENT SCIENCE	131	Q1
415	Morales-Espana, G; Gentile, C; Ramos, A	Tight MIP Formulations Of The Power-Based Unit Commitment Problem	2015	OR SPECTRUM	64	Q1
416	Aharonson, B; Bort, S; Woywode, M	The Influence Of Multinational Corporations On International Alliance Formation Behavior Of Colocated Start-Ups	2020	ORGANIZATION SCIENCE	224	Q1
417	Feldman, MP; Ozcan, S; Reichstein, T	Falling Not Far From The Tree: Entrepreneurs And Organizational Heritage	2019	ORGANIZATION SCIENCE	224	Q1
418	Furr, NR	Product Adaptation During New Industry Emergence: The Role Of Start-Up Team Preentry Experience	2019	ORGANIZATION SCIENCE	224	Q1
419	Tan, D; Tan, J	Far From The Tree? Do Private Entrepreneurs Agglomerate Around Public Sector Incumbents During Economic Transition?	2017	ORGANIZATION SCIENCE	224	Q1

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421	Adams, P; Fontana, R; Malerba, F	User-Industry Spinouts: Downstream Industry Knowledge As A Source Of New Firm Entry And Survival	2016	ORGANIZATION SCIENCE	224	Q1
422	Hsu, DH; Lim, K	Knowledge Brokering And Organizational Innovation: Founder Imprinting Effects	2014	ORGANIZATION SCIENCE	224	Q1
423	Gruber, M; MacMillan, IC; Thompson, JD	Escaping The Prior Knowledge Corridor: What Shapes The Number And Variety Of Market Opportunities Identified Before Market Entry Of Technology Start-Ups?	2013	ORGANIZATION SCIENCE	224	Q1
424	Maula, MVJ; Keil, T; Zahra, SA	Top Management's Attention To Discontinuous Technological Change: Corporate Venture Capital As An Alert Mechanism	2013	ORGANIZATION SCIENCE	224	Q1
425	Qian, LH; Agarwal, R; Hoetker, G	Configuration Of Value Chain Activities: The Effect Of Pre-Entry Capabilities, Transaction Hazards, And Industry Evolution On Decisions To Internalize	2012	ORGANIZATION SCIENCE	224	Q1
426	Benson, D; Ziedonis, RH	Corporate Venture Capital As A Window On New Technologies: Implications For The Performance Of Corporate Investors When Acquiring Startups	2009	ORGANIZATION SCIENCE	224	Q1
427	Wezel, FC; Cattani, G; Pennings, JM	Competitive Implications Of Interfirm Mobility	2006	ORGANIZATION SCIENCE	224	Q1
428	Boeker, W; Wiltbank, R	New Venture Evolution And Managerial Capabilities	2005	ORGANIZATION SCIENCE	224	Q1
429	Baron, T; Freiling, J	Blueprint Silicon Valley? Explaining Idiosyncrasy Of Startup Ecosystems	2019	PROBLEMY ZARZADZANIA-MANAGEMENT ISSUES	-	-
430	Anderson, EG; Jiang, XY; Parker, GG; Tan, B	Systems Integration And The Dynamics Of Partial Outsourcing	2019	PRODUCTION AND OPERATIONS MANAGEMENT	102	Q1
431	Anderson, EG; Parker, GG	Integration And Cospecialization Of Emerging Complementary Technologies By Startups	2013	PRODUCTION AND OPERATIONS MANAGEMENT	102	Q1
432	Tatikonda, MV; Terjesen, SA; Patel, PC; Parida, V	The Role Of Operational Capabilities In Enhancing New Venture Survival: A Longitudinal Study	2013	PRODUCTION AND OPERATIONS MANAGEMENT	102	Q1

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433	Viles, E; Bulto, R; Mateo, R; Jurburg, D	Production Ramp-Up In European Automotive Production Systems: A Performance Analysis	Ahead	PRODUCTION PLANNING & CONTROL	70	Q1
434	Sonta-Draczkowska, E; Mrozewski, M	Exploring The Role Of Project Management In Product Development Of New Technology-Based Firms	2020	PROJECT MANAGEMENT JOURNAL	37	Q1
435	Collyer, S; Warren, C; Hemsley, B; Stevens, C	Aim, Fire, Aim-Project Planning Styles In Dynamic Environments	2010	PROJECT MANAGEMENT JOURNAL	37	Q1
436	De Silva, M; Wright, M	Entrepreneurial Co-Creation: Societal Impact Through Open Innovation	2019	R AND D MANAGEMENT	99	Q1
437	Sedita, SR; Apa, R; Bassetti, T; Grandinetti, R	Incubation Matters: Measuring The Effect Of Business Incubators On The Innovation Performance Of Start-Ups	2019	R AND D MANAGEMENT	99	Q1
438	Wikhamn, BR; Styhre, A	Managerial Challenges Of Outbound Open Innovation: A Study Of A Spinout Initiative In Astrazeneca	2019	R AND D MANAGEMENT	99	Q1
439	Chell, E; Allman, K	Mapping The Motivations And Intentions Of Technology Orientated Entrepreneurs	2003	R AND D MANAGEMENT	99	Q1
440	Tapon, F; Thong, M; Bartell, M	Drug Discovery And Development In Four Canadian Biotech Companies	2001	R AND D MANAGEMENT	99	Q1
441	Nobelius, D	Empowering Project Scope Decisions: Introducing R&D Content Graphs	2001	R AND D MANAGEMENT	99	Q1
442	Van Looy B., Debackere K., Andries P.	Policies To Stimulate Regional Innovation Capabilities Via University-Industry Collaboration: An Analysis And An Assessment	2003	R AND D MANAGEMENT	99	Q1
443	Gonzaga, BS; Figueiredo, PS; Souza, ELRD; Passos, FU	Organizational Learning Capacity Of Startups In Northeast Brazil	2020	REGE-REVISTA DE GESTAO	-	-
444	Epure, M; Prior, D; Serarols, C	Assessing Technology-Based Spin-Offs From University Support Units	2016	REGIONAL STUDIES	111	Q1
445	Harrison, RT; Leitch, C	Voodoo Institution Or Entrepreneurial University? Spin-Off Companies, The Entrepreneurial System And Regional Development In The UK	2010	REGIONAL STUDIES	111	Q1
446	Lee S.-J., Park I.	A Study On The Influence Of Entrepreneurial Competence Characteristics On The Sustainability Of Entrepreneurs-Focused On The Mediating Effects Of Entrepreneurial Mentoring	2020	RESEARCH IN WORLD ECONOMY	2	Q4
447	Li, Daitian	The Long March To Catch-Up: A History-Friendly Model Of China’s Mobile Communications Industry	2019	RESEARCH POLICY	224	Q1

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448	Ramani, Shyama V	When Access To Drugs Meets Catch-Up: Insights From The Use Of CL Threats To Improve Access To ARV Drugs In Brazil	2018	RESEARCH POLICY	224	Q1
449	Andersson, M; Xiao, J	Acquisitions Of Start-Ups By Incumbent Businesses A Market Selection Process Of High-Quality Entrants?	2016	RESEARCH POLICY	224	Q1
450	Stucki, T	How The Founders' General And Specific Human Capital Drives Export Activities Of Start-Ups	2016	RESEARCH POLICY	224	Q1
451	Gambardella, A; Giarratana, MS	General Technological Capabilities, Product Market Fragmentation, And Markets For Technology	2013	RESEARCH POLICY	224	Q1
452	Hewitt-Dundas, N	Research Intensity And Knowledge Transfer Activity In UK Universities	2012	RESEARCH POLICY	224	Q1
453	Muller, K	Academic Spin-Offs Transfer Speed-Analyzing The Time From Leaving University To Venture	2010	RESEARCH POLICY	224	Q1
454	Rasmussen, E; Borch, OJ	University Capabilities In Facilitating Entrepreneurship: A Longitudinal Study Of Spin-Off Ventures At Mid-Range Universities	2010	RESEARCH POLICY	224	Q1
455	Hsu, DH	Experienced Entrepreneurial Founders, Organizational Capital, And Venture Capital Funding	2007	RESEARCH POLICY	224	Q1
456	Mustar, P; Renault, M; Colombo, MG; Piva, E; Fontes, M; Lockett, A; Wright, M; Clarysse, B; Moray, N	Conceptualising The Heterogeneity Of Research-Based Spin-Offs: A Multi-Dimensional Taxonomy	2006	RESEARCH POLICY	224	Q1
457	Colombo, MG; Grilli, L	Founders' Human Capital And The Growth Of New Technology-Based Firms: A Competence-Based View	2005	RESEARCH POLICY	224	Q1
458	Lockett, A; Wright, M	Resources, Capabilities, Risk Capital And The Creation Of University Spin-Out Companies	2005	RESEARCH POLICY	224	Q1
459	Heidenreich, M	The Renewal Of Regional Capabilities Experimental Regionalism In Germany	2005	RESEARCH POLICY	224	Q1
460	Laursen, K; Salter, A	Searching High And Low: What Types Of Firms Use Universities As A Source Of Innovation?	2004	RESEARCH POLICY	224	Q1
461	Giarratana, MS	The Birth Of A New Industry: Entry By Start-Ups And The Drivers Of Firm Growth - The Case Of Encryption Software	2004	RESEARCH POLICY	224	Q1
462	Fontes, M; Coombs, R	Contribution Of New Technology-Based Firms To The Strengthening Of Technological Capabilities In Intermediate Economies	2001	RESEARCH POLICY	224	Q1

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463	Minshall T., Mortara L., Valli R., Probert D.	Making "Asymmetric" Partnerships Work	2010	RESEARCH TECHNOLOGY MANAGEMENT	63	Q1
464	Hwang, S; Shin, J	Using Lean Startup To Power Organizational Transformation Creating An Internal Division That Implemented Concepts From Lean Startup Helped A Consumer Electronics Firm Foster An Entrepreneurial Mindset Among Employees.	2019	RESEARCH TECHNOLOGY MANAGEMENT	63	Q1
465	Ben Mahmoud-Jouini, S; Duvert, C; Esquirol, M	Key Factors In Building A Corporate Accelerator Capability	2018	RESEARCH TECHNOLOGY MANAGEMENT	63	Q1
466	Buenstorf, G	Evolution On The Shoulders Of Giants: Entrepreneurship And Firm Survival In The German Laser Industry	2007	REVIEW OF INDUSTRIAL ORGANIZATION	54	Q2
467	Zalan, T	Born Global On Blockchain	2018	REVIEW OF INTERNATIONAL BUSINESS AND STRATEGY	25	Q2
468	Hora, W; Gast, J; Kailer, N; Rey-Marti, A; Mas-Tur, A	David And Goliath: Causes And Effects Of Coopetition Between Start-Ups And Corporates	2018	REVIEW OF MANAGERIAL SCIENCE	20	Q1
469	Seligmann, BJ; Zhao, JY; Marmar, SG; Corbett, TC; Small, M; Hassall, M; Boadle, JT	Comparing Capability Of Scenario Hazard Identification Methods By The PIC (Plant-People-Procedure Interaction Contribution) Network Metric	2019	SAFETY SCIENCE	100	Q1
470	Exposito-Langa, M; Molina-Morales, FX; Tomas-Miquel, JV	How Shared Vision Moderates The Effects Of Absorptive Capacity And Networking On Clustered Firms' Innovation	2015	SCANDINAVIAN JOURNAL OF MANAGEMENT	54	Q2
471	Yi, GF; Uyarra, E	Process Mechanisms For Academic Entrepreneurial Ecosystems: Insights From A Case Study In China	2018	SCIENCE, TECHNOLOGY AND SOCIETY	20	Q2
472	Wang, KJ; Widagdo, J; Lin, YS; Yang, HL; Hsiao, SL	A Service Innovation Framework For Start-Up Firms By Integrating Service Experience Engineering Approach And Capability Maturity Model	2016	SERVICE BUSINESS	28	Q1
473	Fernandez-Guerrero, R; Revuelto-Taboada, L; Simon-Moya, V	The Business Plan As A Project: An Evaluation Of Its Predictive Capability For Business Success	2012	SERVICE INDUSTRIES JOURNAL	62	Q2
474	Muratovski G.	Paradigm Shift: Report On The New Role Of Design In Business And Society	2015	SHE JI	8	Q2

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475	Ruiz-Jimenez, JM; Ruiz-Arroyo, M; Fuentes-Fuentes, MD	The Impact Of Effectuation, Causation, And Resources On New Venture Performance: Novice Versus Expert Entrepreneurs	Ahead	SMALL BUSINESS ECONOMICS	120	Q1
476	Baptista, R; Karaoz, M; Leitao, JC	Diversification By Young, Small Firms: The Role Of Pre-Entry Resources And Entry Mistakes	2020	SMALL BUSINESS ECONOMICS	120	Q1
477	Buenstorf, G; Heinisch, DP	Science And Industry Evolution: Evidence From The First 50 Years Of The German Laser Industry	2020	SMALL BUSINESS ECONOMICS	120	Q1
478	Vaillant, Y; Lafuente, E; Bayon, MC	Early Internationalization Patterns And Export Market Persistence: A Pseudo-Panel Data Analysis	2019	SMALL BUSINESS ECONOMICS	120	Q1
479	Sperber, S; Linder, C	Gender-Specifics In Start-Up Strategies And The Role Of The Entrepreneurial Ecosystem	2019	SMALL BUSINESS ECONOMICS	120	Q1
480	Cotei, C; Farhat, J	The M&A Exit Outcomes Of New, Young Firms	2018	SMALL BUSINESS ECONOMICS	120	Q1
481	Mickiewicz, T; Nyakudya, FW; Theodorakopoulos, N; Hart, M	Resource Endowment And Opportunity Cost Effects Along The Stages Of Entrepreneurship	2017	SMALL BUSINESS ECONOMICS	120	Q1
482	Mueller, S; Stegmaier, J	Economic Failure And The Role Of Plant Age And Size	2015	SMALL BUSINESS ECONOMICS	120	Q1
483	Lejpras, A	How Innovative Are Spin-Offs At Later Stages Of Development? Comparing Innovativeness Of Established Research Spin-Offs And Otherwise Created Firms	2014	SMALL BUSINESS ECONOMICS	120	Q1
484	Fryges, H; Muller, B; Niefert, M	Job Machine, Think Tank, Or Both: What Makes Corporate Spin-Offs Different?	2014	SMALL BUSINESS ECONOMICS	120	Q1
485	Baptista, R; Karaoz, M; Mendonca, J	The Impact Of Human Capital On The Early Success Of Necessity Versus Opportunity-Based Entrepreneurs	2014	SMALL BUSINESS ECONOMICS	120	Q1
486	Fryges, H; Wright, M	The Origin Of Spin-Offs: A Typology Of Corporate And Academic Spin-Offs	2014	SMALL BUSINESS ECONOMICS	120	Q1
487	Dick, JMH; Hussinger, K; Blumberg, B; Hagedoorn, J	Is Success Hereditary? Evidence On The Performance Of Spawned Ventures	2013	SMALL BUSINESS ECONOMICS	120	Q1
488	Devigne, D; Vanacker, T; Manigart, S; Paeleman, I	The Role Of Domestic And Cross-Border Venture Capital Investors In The Growth Of Portfolio Companies	2013	SMALL BUSINESS ECONOMICS	120	Q1
489	Bertoni, F; Colombo, MG; Grilli, L	Venture Capital Investor Type And The Growth Mode Of New Technology-Based Firms	2013	SMALL BUSINESS ECONOMICS	120	Q1
490	Gonzalez-Pernia, JL; Pena-Legazkue, I; Vendrell-Herrero, F	Innovation, Entrepreneurial Activity And Competitiveness At A Sub-National Level	2012	SMALL BUSINESS ECONOMICS	120	Q1

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492	Esteve-Perez, S; Manez-Castillejo, JA	The Resource-Based Theory Of The Firm And Firm Survival	2008	SMALL BUSINESS ECONOMICS	120	Q1
493	Reid, GC; Smith, JA	What Makes A New Business Start-Up Successful?	2000	SMALL BUSINESS ECONOMICS	120	Q1
494	Kansheba, JMP	Small Business And Entrepreneurship In Africa: The Nexus Of Entrepreneurial Ecosystems And Productive Entrepreneurship	2020	SMALL ENTERPRISE RESEARCH	-	-
495	Suzuki K., Tochimoto K., Isomura K.	Park24's Market Creation And Game-Changing Strategy: Leveraging Its Strategic Resources And Capabilities	2017	STRATEGIC DIRECTION	10	Q4
496	[No author name available]	The Start-Up Challenge	2002	STRATEGIC DIRECTION	10	Q4
497	Zhou J., Ge L.G., Li J., Chandrashekar S.P.	Entrepreneurs' Socioeconomic Status And Government Expropriation In An Emerging Economy	2020	STRATEGIC ENTREPRENEURSHIP JOURNAL	38	Q1
498	Haeussler, C; Hennicke, M; Mueller, E	Founder-Inventors And Their Investors: Spurring Firm Survival And Growth	2019	STRATEGIC ENTREPRENEURSHIP JOURNAL	38	Q1
499	Greul, A; West, J; Bock, S	Open At Birth? Why New Firms Do (Or Don't) Use Open Innovation	2018	STRATEGIC ENTREPRENEURSHIP JOURNAL	38	Q1
500	Symeonidou, N; Nicolaou, N	Resource Orchestration In Start-Ups: Synchronizing Human Capital Investment, Leveraging Strategy, And Founder Start-Up Experience	2018	STRATEGIC ENTREPRENEURSHIP JOURNAL	38	Q1
501	Hashai, N; Zander, I	The Evolution Of Vertical Boundaries In New High Technology Ventures	2018	STRATEGIC ENTREPRENEURSHIP JOURNAL	38	Q1
502	Chen, PL; Kor, Y; Mahoney, JT; Tan, DC	Pre-Market Entry Experience And Post-Market Entry Learning Of The Board Of Directors: Implications For Post-Entry Performance	2017	STRATEGIC ENTREPRENEURSHIP JOURNAL	38	Q1
503	Autio, E	Strategic Entrepreneurial Internationalization: A Normative Framework	2017	STRATEGIC ENTREPRENEURSHIP JOURNAL	38	Q1
504	Basu, S; Phelps, CC; Kotha, S	Search And Integration In External Venturing: An Inductive Examination Of Corporate Venture Capital Units	2016	STRATEGIC ENTREPRENEURSHIP JOURNAL	38	Q1

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505	Park, HD; Steensma, HK	The Selection And Nurturing Effects Of Corporate Investors On New Venture Innovativeness	2013	STRATEGIC ENTREPRENEURSHIP JOURNAL	38	Q1
506	Brinckmann, J; Hoegl, M	Effects Of Initial Teamwork Capability And Initial Relational Capability On The Development Of New Technology-Based Firms	2011	STRATEGIC ENTREPRENEURSHIP JOURNAL	38	Q1
507	Clarysse, B; Bruneel, J; Wright, M	Explaining Growth Paths Of Young Technology-Based Firms: Structuring Resource Portfolios In Different Competitive Environments	2011	STRATEGIC ENTREPRENEURSHIP JOURNAL	38	Q1
508	Bennett, VM; Hall, TA	Software Availability And Entry	2020	STRATEGIC MANAGEMENT JOURNAL	269	Q1
509	Nikiforou, A; Dencker, JC; Gruber, M	Necessity Entrepreneurship And Industry Choice In New Firm Creation	2019	STRATEGIC MANAGEMENT JOURNAL	269	Q1
510	Chatterji, A; Delecourt, S; Hasan, S; Koning, R	When Does Advice Impact Startup Performance?	2019	STRATEGIC MANAGEMENT JOURNAL	269	Q1
511	Blevins, DP; Ragozzino, R	An Examination Of The Effects Of Venture Capitalists On The Alliance Formation Activity Of Entrepreneurial Firms	2018	STRATEGIC MANAGEMENT JOURNAL	269	Q1
512	Makarevich, A	Performance Feedback As A Cooperation Switch: A Behavioral Perspective On The Success Of Venture Capital Syndicates Among Competitors	2018	STRATEGIC MANAGEMENT JOURNAL	269	Q1
513	Arora, A; Belenzon, S; Patacconi, A	The Decline Of Science In Corporate R&D	2018	STRATEGIC MANAGEMENT JOURNAL	269	Q1
514	Chen, TX; Qian, LH; Narayanan, V	Battle On The Wrong Field? Entrant Type, Dominant Designs, And Technology Exit	2017	STRATEGIC MANAGEMENT JOURNAL	269	Q1
515	Monteiro, F; Birkinshaw, J	The External Knowledge Sourcing Process In Multinational Corporations	2017	STRATEGIC MANAGEMENT JOURNAL	269	Q1
516	Greenstein, S	The Reference Wars: Encyclopaedia Britannica's Decline And Encarta's Emergence	2017	STRATEGIC MANAGEMENT JOURNAL	269	Q1
517	Wasserman, N	The Throne Vs. The Kingdom: Founder Control And Value Creation In Startups	2017	STRATEGIC MANAGEMENT JOURNAL	269	Q1
518	Zheng, YF; Devaughn, ML; Zellmer-Bruhn, M	Shared And Shared Alike? Founders' Prior Shared Experience And Performance Of Newly Founded Banks	2016	STRATEGIC MANAGEMENT JOURNAL	269	Q1
519	Kapoor, R; Furr, NR	Complementarities And Competition: Unpacking The Drivers Of Entrants' Technology Choices In The Solar Photovoltaic Industry	2015	STRATEGIC MANAGEMENT JOURNAL	269	Q1

ID	Authors	Title	Year	Journal	H-Index	Quartile
520	Arora, A; Nandkumar, A	Insecure Advantage? Markets For Technology And The Value Of Resources For Entrepreneurial Ventures	2012	STRATEGIC MANAGEMENT JOURNAL	269	Q1
521	Dushnitsky G., Shaver J.M.	Limitations To Interorganizational Knowledge Acquisition: The Paradox Of Corporate Venture Capital	2009	STRATEGIC MANAGEMENT JOURNAL	269	Q1
522	Aggarwal, VA; Hsu, DH	Modes Of Cooperative R&D Commercialization By Start-Ups	2009	STRATEGIC MANAGEMENT JOURNAL	269	Q1
523	Forbes D.P.	Managerial Determinants Of Decision Speed In New Ventures	2005	STRATEGIC MANAGEMENT JOURNAL	269	Q1
524	Lee C., Lee K., Pennings J.M.	Internal Capabilities, External Networks, And Performance: A Study On Technology-Based Ventures	2001	STRATEGIC MANAGEMENT JOURNAL	269	Q1
525	Brouthers, KD; Brouthers, LE	Acquisition Or Greenfield Start-Up? Institutional, Cultural And Transaction Cost Influences	2000	STRATEGIC MANAGEMENT JOURNAL	269	Q1
526	Baum, JAC; Calabrese, T; Silverman, BS	Don't Go It Alone: Alliance Network Composition And Startups' Performance In Canadian Biotechnology	2000	STRATEGIC MANAGEMENT JOURNAL	269	Q1
527	Sears, JB; McLeod, MS; Evert, RE; Payne, GT	Alleviating Concerns Of Misappropriation In Corporate Venture Capital: Creating Credible Commitments And Calculative Trust	Ahead	STRATEGIC ORGANIZATION	51	Q1
528	Hoang, H; Ener, H	Unpacking Experience Effects In Developing Novel Products For New Markets	2015	STRATEGIC ORGANIZATION	51	Q1
529	Foss, NJ; Lyngsie, J	The Strategic Organization Of The Entrepreneurial Established Firm	2014	STRATEGIC ORGANIZATION	51	Q1
530	Belkhir L., Välikangas L., Merlyn P.	One CEO's Product Development Motto: Care For Innovations Like Newborns!	2003	STRATEGY & LEADERSHIP	44	Q3
531	Sterling J.	Rubicon Technology: A High Tech Start-Up Successfully Practices Strategic Focus	2002	STRATEGY & LEADERSHIP	44	Q3
532	Porta M., House B., Buckley L., Blitz A.	Value 2.0: Eight New Rules For Creating And Capturing Value From Innovative Technologies	2008	STRATEGY AND LEADERSHIP	44	Q3
533	Kim, JY; Park, HD	Two Faces Of Early Corporate Venture Capital Funding: Promoting Innovation And Inhibiting Ipos	2017	STRATEGY SCIENCE	-	-
534	Kaya, HD	The Impact Of The 2008-2009 Global Crisis On Entrepreneurial Aspirations And Attitudes	2019	STUDIES IN BUSINESS AND ECONOMICS	2	Q4
535	Wang, ZX; He, QL; Xia, SM; Sarpong, D; Xiong, AL; Maas, G	Capacities Of Business Incubator And Regional Innovation Performance	2020	TECHNOLOGICAL FORECASTING AND SOCIAL CHANGE	103	Q1

ID	Authors	Title	Year	Journal	H-Index	Quartile
536	Falahat, M; Ramayah, T; Soto-Acosta, P; Lee, YY	Smes Internationalization: The Role Of Product Innovation, Market Intelligence, Pricing And Marketing Communication Capabilities As Drivers Of Smes' International Performance	2020	TECHNOLOGICAL FORECASTING AND SOCIAL CHANGE	103	Q1
537	Amankwah-Amoah, J; Hinson, RE	Contextual Influences On New Technology Ventures: A Study Of Domestic Firms In Ghana	2019	TECHNOLOGICAL FORECASTING AND SOCIAL CHANGE	103	Q1
538	Zhang L., Guo Y., Sun G.	How Patent Signals Affect Venture Capital: The Evidence Of Bio-Pharmaceutical Start-Ups In China	2019	TECHNOLOGICAL FORECASTING AND SOCIAL CHANGE	103	Q1
539	Dong, JQ	Moving A Mountain With A Teaspoon: Toward A Theory Of Digital Entrepreneurship In The Regulatory Environment	2019	TECHNOLOGICAL FORECASTING AND SOCIAL CHANGE	103	Q1
540	Le, DN; Tuan, LL; Tuan, MND	Smart-Building Management System: An Internet-Of-Things (Iot) Application Business Model In Vietnam	2019	TECHNOLOGICAL FORECASTING AND SOCIAL CHANGE	103	Q1
541	Gupta, Gaurav	Strategic Learning For Digital Market Pioneering: Examining The Transformation Of Wishberry's Crowdfunding Model	2019	TECHNOLOGICAL FORECASTING AND SOCIAL CHANGE	103	Q1
542	Polzin, F; Sanders, M; Stavlot, U	Do Investors And Entrepreneurs Match? - Evidence From The Netherlands And Sweden	2018	TECHNOLOGICAL FORECASTING AND SOCIAL CHANGE	103	Q1
543	Reynolds, Elisabeth B	Strengthening Advanced Manufacturing Innovation Ecosystems: The Case Of Massachusetts	2018	TECHNOLOGICAL FORECASTING AND SOCIAL CHANGE	103	Q1
544	Jensen, A; Clausen, TH	Origins And Emergence Of Exploration And Exploitation Capabilities In New Technology-Based Firms	2017	TECHNOLOGICAL FORECASTING AND SOCIAL CHANGE	103	Q1
545	Kiamehr, Mehdi	Paths Of Technological Capability Building In Complex Capital Goods: The Case Of Hydro Electricity Generation Systems In Iran	2017	TECHNOLOGICAL FORECASTING AND SOCIAL CHANGE	103	Q1
546	Ghazinoory, Sepehr	Technology Roadmapping Architecture Based On Technological Learning: Case Study Of Social Banking In Iran	2017	TECHNOLOGICAL FORECASTING AND SOCIAL CHANGE	103	Q1
547	Jun, SP; Kim, SG; Park, HW	The Mismatch Between Demand And Beneficiaries Of R&D Support Programs For Smes: Evidence From Korean R&D Planning Programs	2017	TECHNOLOGICAL FORECASTING AND SOCIAL CHANGE	103	Q1

ID	Authors	Title	Year	Journal	H-Index	Quartile
548	Ehrenhard, M; Wijnhoven, F; van den Broek, T; Stagno, MZ	Unlocking How Start-Ups Create Business Value With Mobile Applications: Development Of An App-Enabled Business Innovation Cycle	2017	TECHNOLOGICAL FORECASTING AND SOCIAL CHANGE	103	Q1
549	Wong, CY; Goh, KL	Catch-Up Models Of Science And Technology: A Theorization Of The Asian Experience From Bi-Logistic Growth Trajectories	2015	TECHNOLOGICAL FORECASTING AND SOCIAL CHANGE	103	Q1
550	Reid, SE; Ramani, SV	The Harnessing Of Biotechnology In India: Which Roads To Travel?	2012	TECHNOLOGICAL FORECASTING AND SOCIAL CHANGE	103	Q1
551	Chang, YC; Chen, MH; Hua, MS; Yang, PY	Managing Academic Innovation In Taiwan: Towards A 'Scientific-Economic' Framework	2006	TECHNOLOGICAL FORECASTING AND SOCIAL CHANGE	103	Q1
552	Zhang, K; Wang, JF; Feng, LJ; Cheng, Y	The Evolution Mechanism Of Latecomer Firms Value Network In Disruptive Innovation Context: A Case Study Of Haier Group	2019	TECHNOLOGY ANALYSIS AND STRATEGIC MANAGEMENT	64	Q2
553	Ma, XF; Zhou, Z; Fan, XH	The Process Of Dynamic Capability Emergence In Technology Start-Ups - An Exploratory Longitudinal Study In China	2015	TECHNOLOGY ANALYSIS AND STRATEGIC MANAGEMENT	64	Q2
554	Zerbinati, S; Souitaris, V; Moray, N	Nurture Or Nature? The Growth Paradox Of Research-Based Spin-Offs	2012	TECHNOLOGY ANALYSIS AND STRATEGIC MANAGEMENT	64	Q2
555	Bianchi, M; Chiaroni, D; Chiesa, V; Frattini, F	Exploring The Role Of Human Resources In Technology Out-Licensing: An Empirical Analysis Of Biotech New Technology-Based Firms	2011	TECHNOLOGY ANALYSIS AND STRATEGIC MANAGEMENT	64	Q2
556	Bower, DJ; Sulej, JC	The Indian Challenge: The Evolution Of A Successful New Global Strategy In The Pharmaceutical Industry	2007	TECHNOLOGY ANALYSIS AND STRATEGIC MANAGEMENT	64	Q2
557	Fan P., Urs N., Hamlin R.E.	Rising Innovative City-Regions In A Transitional Economy: A Case Study Of ICT Industry In Cluj-Napoca, Romania	2019	TECHNOLOGY IN SOCIETY	47	Q2
558	Bonfim L.R.C., Segatto A.P., Gonçalves S.A.	A Conical-Helix Model Of Technology Transfer And Public-Private Partnerships For Technological Development In Brazilian Public Health	2018	TECHNOLOGY IN SOCIETY	47	Q2
559	Krishnaswamy K.N., Mathirajan M., Bala Subrahmanya M.H.	Technological Innovations And Its Influence On The Growth Ofauto Component Smes Of Bangalore: A Case Study Approach	2014	TECHNOLOGY IN SOCIETY	47	Q2

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560	Joshi, T	The Dynamics Of Knowledge Sharing In The Biotechnology Industry: An Indian Perspective	2018	TECHNOLOGY INNOVATION MANAGEMENT REVIEW	-	-
561	Enkel, E; Sagmeister, V	External Corporate Venturing Modes As New Way To Develop Dynamic Capabilities	2020	TECHNOVATION	121	Q1
562	Mitze, T; Strotebeck, F	Determining Factors Of Interregional Research Collaboration In Germany's Biotech Network: Capacity, Proximity, Policy?	2019	TECHNOVATION	121	Q1
563	Deligianni, I; Voudouris, I; Spanos, Y; Lioukas, S	Non-Linear Effects Of Technological Competence On Product Innovation In New Technology-Based Firms: Resource Orchestration And The Role Of The Entrepreneur's Political Competence And Prior Start-Up Experience	2019	TECHNOVATION	121	Q1
564	Mrkajic, Boris	Business Incubation Models And Institutionally Void Environments	2017	TECHNOVATION	121	Q1
565	Zhou, HB; Sandner, PG; Martinelli, SL; Block, JH	Patents, Trademarks, And Their Complementarity In Venture Capital Funding	2016	TECHNOVATION	121	Q1
566	Scholten, V; Omta, O; Kemp, R; Elfring, T	Bridging Ties And The Role Of Research And Start-Up Experience On The Early Growth Of Dutch Academic Spin-Offs	2015	TECHNOVATION	121	Q1
567	Paradkar, A; Knight, J; Hansen, P	Innovation In Start-Ups: Ideas Filling The Void Or Ideas Devoid Of Resources And Capabilities?	2015	TECHNOVATION	121	Q1
568	Funk, JL; Luo, JX	Open Standards, Vertical Disintegration And Entrepreneurial Opportunities: How Vertically-Specialized Firms Entered The US Semiconductor Industry	2015	TECHNOVATION	121	Q1
569	Brown, R; Mason, C	Inside The High-Tech Black Box: A Critique Of Technology Entrepreneurship Policy	2014	TECHNOVATION	121	Q1
570	Ortin-Angel, P; Vendrell-Herrero, F	University Spin-Offs Vs. Other Ntbfs: Total Factor Productivity Differences At Outset And Evolution	2014	TECHNOVATION	121	Q1
571	Li, YR; Chen, Y	Opportunity, Embeddedness, Endogenous Resources, And Performance Of Technology Ventures In Taiwan's Incubation Centers	2009	TECHNOVATION	121	Q1
572	Candi, M; Saemundsson, R	Oil In Water? Explaining Differences In Aesthetic Design Emphasis In New Technology-Based Firms	2008	TECHNOVATION	121	Q1
573	Chorev, S; Anderson, AR	Success In Israeli High-Tech Start-Ups; Critical Factors And Process	2006	TECHNOVATION	121	Q1

ID	Authors	Title	Year	Journal	H-Index	Quartile
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575	Lofsten, H; Lindelof, P	R&D Networks And Product Innovation Patterns - Academic And Non-Academic New Technology-Based Firms On Science Parks	2005	TECHNOVATION	121	Q1
576	Igel, B; Islam, N	Strategies For Service And Market Development Of Entrepreneurial Software Designing Firms	2001	TECHNOVATION	121	Q1
577	Carayannis, EG; Roy, RIS	Davids Vs Goliaths In The Small Satellite Industry: The Role Of Technological Innovation Dynamics In Firm Competitiveness	2000	TECHNOVATION	121	Q1
578	Carvalho, L; Galina, S; Sanchez-Hernandez, MI	An International Perspective Of The Business Incubators' Perception About Business Model Canvas For Startups	2020	THUNDERBIRD INTERNATIONAL BUSINESS REVIEW	33	Q1
579	Cetindamar, D; Lammers, T; Zhang, Y	Exploring The Knowledge Spillovers Of A Technology In An Entrepreneurial Ecosystem-The Case Of Artificial Intelligence In Sydney	2020	THUNDERBIRD INTERNATIONAL BUSINESS REVIEW	33	Q1
580	Andersson, S; Sundermeier, J	Firms' Use Of Organizational, Personal, And Intermediary Networks To Gain Access To Resources For Internationalization	2019	THUNDERBIRD INTERNATIONAL BUSINESS REVIEW	33	Q1
581	Oguji, N; Owusu, RA	Acquisitions Entry Strategies In Africa: The Role Of Institutions, Target Specific Experience, And Host-Country Capabilities-The Case Acquisitions Of Finnish Multinationals In Africa	2017	THUNDERBIRD INTERNATIONAL BUSINESS REVIEW	33	Q1
582	Acosta-Prado J.C., Romero Severiche A.K., Tafur-Mendoza A.A.	Conditions Of Knowledge Management, Innovation Capability And Firm Performance In Colombian Ntbfs: A Measurement Scale	2020	VINE JOURNAL OF INFORMATION AND KNOWLEDGE MANAGEMENT SYSTEMS	28	Q2
583	Wadho, W; Goedhuys, M; Chaudhry, A	Young Innovative Companies And Employment Creation, Evidence From The Pakistani Textiles Sector	2019	WORLD DEVELOPMENT	164	Q1
584	Prieger, JE; Bampoky, C; Blanco, LR; Liu, AL	Economic Growth And The Optimal Level Of Entrepreneurship	2016	WORLD DEVELOPMENT	164	Q1

Appendix C – Interview protocol – Model Validation (Portuguese Version)

Roteiro de Entrevista – Validação Inicial do Modelo

Introdução

Olá. Primeiramente, obrigado por concordar em participar deste estudo. Para começar a nossa entrevista, você poderia nos contar um pouco sobre a sua empresa e como a pandemia influenciou o seu negócio? O volume de atividades ou negócios mudou?

Seção 1 – Fase de conceitualização (pré-startup)

Nesta fase não há ainda um negócio concreto em operação. A conceitualização é o momento de identificação de uma oportunidade de mercado e estudo de uma possível solução, segmento e público-alvo. É o momento em que as primeiras ideias de negócio e de produto ou serviço (Mínimo Produto Viável - MVP) são desenvolvidas e testadas junto ao mercado. Nesta fase, perguntas comuns a serem respondidas são: “qual é o problema que o meu negócio resolve?”, “quem é o nosso cliente?”, “qual solução oferecemos?”, “qual é o nosso modelo de negócio?”.

a) Na sua percepção, quais foram os fatores de sucesso da sua startup na fase de conceitualização do negócio? Quais fatores foram fundamentais para superar a fase de conceitualização e estabelecer os primeiros passos do negócio (fase de operação/startup)? Por exemplo, quais práticas, habilidades e/ou recursos que foram fundamentais nesta fase?
b) No sentido contrário, quais foram os fatores inibidores ou restringentes nesta fase?

Seção 2 – Fase de operação (startup)

Nesta fase, a startup está pronta para começar a oferecer a solução que desenvolveu, ainda que em uma versão inicial ou enxuta, chamada de Mínimo Produto Viável (MVP). O foco é garantir que o conceito de produto proposto funcione conforme projetado e os protótipos iniciais sejam refinados para atender às necessidades do mercado. Além de iniciar a operação, neste momento também é comum apresentar o negócio à investidores e participar de programas de desenvolvimento de startups.

a) Na sua percepção, quais foram os fatores de sucesso da sua startup na fase de operação (startup)? Quais fatores foram fundamentais para superar essa fase e entrar no processo de escalonamento (scale-up) do negócio? Por exemplo, quais práticas, habilidades e/ou recursos que foram fundamentais para isso?
b) No sentido contrário, quais foram os fatores inibidores ou restringentes nesta fase?

Seção 3 – Fase de escalonamento (scale-up)

A fase de escalonamento (scale-up) é o momento em que a startup estrutura a empresa e o modelo de negócio para atingir um escalonamento consistente e exponencial, seja em receita, em número de vendas ou clientes. Esta fase costuma ser o auge do desenvolvimento da startup.

a) Na sua percepção, quais foram os fatores de sucesso da sua startup na fase de escalonamento (scale-up) do negócio? Quais fatores foram fundamentais para a estruturação deste processo? Por exemplo, quais práticas, habilidades e/ou recursos que são fundamentais para isso?
b) No sentido contrário, quais foram os fatores inibidores ou restringentes nesta fase?

Seção 4 – Capacidades críticas de desempenho (somente questionar caso o entrevistado não mencionar nada a respeito)

Capacidade 1: Capacidade de rede (networking). Esta capacidade reflete as habilidades da sua equipe em mobilizar e aplicar recursos oriundo das redes e relacionamentos, formais e informais, das quais a empresa faz parte. Por favor, você poderia nos falar mais ou dar exemplos sobre:

- Práticas da sua equipe utilizadas para construir relacionamentos.
- Práticas utilizadas para aproveitar relacionamentos pessoais próximos para garantir recursos financeiros e de pessoal.

- Práticas da sua equipe para resolver problemas e criar soluções de forma construtiva com seus parceiros.

a) Na sua opinião, estas práticas são um dos diferenciais da sua empresa? Existe alguma fase do negócio em que elas são mais importantes (conceitualização, operação ou escalonamento)?

Capacidade 2: Capacidade tecnológica. Esta capacidade reflete as habilidades de sua equipe em melhorar produtos e serviços, empregar conhecimento técnico para o desenvolvimento de novos produtos e serviços, habilidades gerais de realizar atividades tecnológicas. Por favor, você poderia nos falar mais ou dar exemplos sobre:

- As práticas utilizadas pela sua empresa para conduzir atividades de P&D, melhorando conhecimentos e habilidades.
- A eficiência da sua equipe em empregar conhecimentos técnicos e resultados de P&D para o desenvolvimento (ou atualização) de novos produtos ou serviços.

a) Na sua opinião, estas práticas são um dos diferenciais da sua empresa? Existe alguma fase do negócio em que elas são mais importantes (conceitualização, operação ou escalonamento)?

Capacidade 3: Capacidade de marketing. Esta capacidade reflete as habilidades de sua equipe em identificar necessidades do mercado, precificar adequadamente, atrair e reter clientes, adicionar valor aos diversos parceiros/canais etc. Por favor, você poderia nos falar mais ou dar exemplos sobre:

- A eficiência de sua equipe em garantir que os esforços relacionados ao produto atendam às necessidades do cliente.
- As práticas da sua empresa para desenvolver programas de publicidade e promoção.
- A eficiência da sua equipe em agregar valor aos membros dos canais de venda e distribuição (por exemplo, distribuidores, varejistas e atacadistas).
- As práticas da sua equipe para gerenciar as vendas de forma adequada.

a) Na sua opinião, estas práticas são um dos diferenciais da sua empresa? Existe alguma fase do negócio em que elas são mais importantes (conceitualização, operação ou escalonamento)?

Capacidade 4: Capacidade de inovação. Esta capacidade reflete as habilidades de sua equipe em adotar novas ideias, novas maneiras de fazer as coisas, de ser criativa nos métodos de operação, ser o primeiro a lançar novos produtos ou serviços, lidar com riscos e incertezas e lançar frequentemente novos produtos ou serviços. Por favor, você poderia nos falar mais ou dar exemplos sobre:

- A eficiência da sua equipe em lançar frequentemente novos produtos e/ou serviços.
- As práticas empregadas para experimentar novas maneiras de fazer as coisas.
- A práticas utilizadas para lidar com riscos e incertezas inerentes às atividades inovadoras.

a) Na sua opinião, estas práticas são um dos diferenciais da sua empresa? Existe alguma fase do negócio em que elas são mais importantes (conceitualização, operação ou escalonamento)?

Capacidade 5: Capacidades dinâmicas baseadas em conhecimento. Estas capacidades refletem a habilidade da sua equipe em adquirir, criar e combinar conhecimento externo útil. Por favor, você poderia nos falar mais ou dar exemplos sobre:

- As práticas empregadas pela sua equipe para adquirir novos conhecimentos e práticas, combinando e aplicando o conhecimento existente na empresa com o conhecimento adquirido externamente.
- A eficiência da sua equipe em coordenar redes internas e externas para combinar conhecimento de forma eficaz.

a) Na sua opinião, estas práticas são um dos diferenciais da sua empresa? Existe alguma fase do negócio em que elas são mais importantes (conceitualização, operação ou escalonamento)?

Seção 5 – A importância do ecossistema de conhecimento

a) A sua empresa costuma utilizar conhecimento de universidades e/ou centros de pesquisa no seu negócio? Caso positivo, quais tipos de conhecimentos você adquiriu destes parceiros? Por favor, nos fale mais ou dê exemplos de como sua empresa adquiriu e aplicou conhecimentos externos que foram essenciais para o desenvolvimento do seu negócio em cada uma das fases do negócio (conceitualização, operação ou escalonamento).

Tipos de conhecimento (para uso interno, caso necessário):

1. Conhecimento técnico.
2. Conhecimento de gestão.
3. Conhecimento de mercado.
4. Conhecimento de manufatura e processos.
5. Outro conhecimento ou expertise.

b) Caso o respondente não fale em algum destes canais, questionar sobre a importância de:

1. CH01 - Contratos de P&D
2. CH02 - Serviços e consultorias
3. CH03 - Projetos conjuntos de P&D
4. CH04 - Contratos de transferência de tecnologia
5. CH05 - Treinamento de RH
6. CH06 - Publicações conjuntas
7. CH07 - Codireção de Teses
8. CH08 - Contratação de alunos
9. CH09 - Contratação de pesquisadores / fellows in company
10. CH10 - Participação conjunta em conferências
11. CH11 - Criação de redes de pesquisadores e praticantes
12. CH12 - Licenciamento de Propriedade Intelectual
13. CH13 - Desenvolvimento de startups
14. CH14 - Desenvolvimento Spin-offs

c) O conhecimento externo, oriundo das universidades e/ou centro de pesquisas, foi mais importante em alguma fase específica do negócio? Por quê?

Questionamentos finais: Caso seja necessário, você estaria disponível para participar de novas entrevistas? Você tem alguma recomendação de gestores ou fundadores de agtech que possam estar interessados em participar deste estudo?

Seção 6. Perfil do negócio e do respondente

1. **Data da entrevista:** ___/___/______ (dd/mm/aaaa)

2. **Perfil da agtech (pré-requisitos):**
   a) A empresa é independente de grandes corporações (*non-spinoff company*)?

      ☐Sim

      ☐Não

   b) O negócio já passou ou está atualmente em fase de escalonamento (*scale-up*)?

      ☐Sim

      ☐Não

   c) Ano de fundação do negócio: ______ (aaaa)

   d) Número de colaboradores: ______

   e) Mercado de atuação (é possível selecionar mais de uma opção):

      I. Antes da fazenda

         ☐ Análise laboratorial

         ☐ Crédito, permuta, seguro, créditos de carbono e análise fiduciária

         ☐ Fertilizantes, Inoculantes e Nutrição Vegetal

         ☐ Genômica e Reprodução Animal

         ☐ Marketplace de Insumos para o Agronegócio

         ☐ Nutrição e Saúde Animal

☐ Sementes, Mudas e Genômica Vegetal.

II. Dentro da fazenda

☐ Apicultura e Polinização

☐ Conectividade e Telecomunicação

☐ Conteúdo, Educação, Mídia Social

☐ Controle Biológico e Manejo Integrado de Pragas

☐ Drones, Máquinas e Equipamentos

☐ Economia compartilhada

☐ Gestão de resíduos agrícolas

☐ IOT para o Agro: detecção de pragas, solo, clima e irrigação

☐ Meteorologia e Irrigação e Gestão de Água

☐ Plataforma integradora de sistemas, soluções e dados

☐ Sensoriamento Remoto, Diagnóstico e Monitoramento por Imagens

☐ Sistema de Gestão de Propriedade Rural

☐ Telemetria e Automação

III. Depois da fazenda

☐ Alimentos inovadores e novas tendências alimentares

☐ Armazenamento, Infraestrutura e Logística

☐ Biodiversidade e Sustentabilidade

☐ Bioenergia e Energia Renovável

☐ Cozinha na nuvem e cozinha fantasma

☐ Indústria e processamento de alimentos 4.0

☐ Market places e plataformas de negociação e venda de produtos agro

☐ Mercearia on-line

☐ Plantio urbano: fábrica de plantas e novas formas de plantio

☐ Restaurantes on-line e Kit de refeições

☐ Segurança e rastreabilidade de alimentos

☐ Sistema autônomo de gerenciamento de lojas e serviços de aliment.

☐ Sistemas de embalagem, Meio Ambiente e Reciclagem

3. Perfil do respondente:

a) **Nome do entrevistado(a):** ____

b) **Idade (em anos): _______**anos

c) **Tempo de trabalho na empresa: _______**anos

d) **Gênero:**

☐ Feminino

☐ Masculino

☐ Prefiro não declarar

e) **Nível de escolaridade (completo):**

☐ Ensino Fundamental

☐ Ensino Médio

☐ Graduação

☐ Especialização ou MBA

☐ Mestrado

☐ Doutorado ou Pós-Doutorado

f) **Área do conhecimento:**

☐ Ciências Exatas e da Terra

☐ Ciências Biológicas

☐ Engenharias

☐ Ciências da Saúde

☐ Ciências Agrárias

☐ Linguística, Letras e Artes

☐ Ciências Sociais Aplicadas

☐ Ciências Humanas

g) **Experiência prévia (antes da abertura deste negócio):**

a. Experiência no mesmo setor do negócio atual: _______anos

b. Experiência em gestão: _______anos

c. Experiência como proprietário ou sócio de outros negócios: _______anos

h) Responsabilidade no negócio atual:

☐ Sócio(a)

☐ Gestor(a)

☐ Ambos (sócio e gestor)

Appendix D – Interview protocol – Model Validation (French Version)

Feuille de route de l'interview - Validation initiale du modèle

Introduction

Bonjour, tout d'abord merci pour avoir accepté de participer à cette étude. Pour commencer, pouvez-vous nous parler un peu de votre entreprise et comment les activités se portent pendant la pandémie ? Est-ce que le volume d'activités a varié ?

Section 1 - Phase de conceptualisation (*pre-startup*)

À ce stade, l'entreprise n'est pas encore concrètement en activité. La conceptualisation concerne le moment de l'identification d'une opportunité de marché et d'étude d'une solution, d'un segment et d'une cible possible. Il s'agit de la première idée d'entreprise, de produit ou de service (*Minimum Viable Product - MVP*) qui sera développée et testée sur le marché. Les questions les plus fréquemment posées sont les suivantes : « Quel problème mon entreprise résout ? », « Qui est notre client ? « Quelle est notre solution ? », « Quel est notre modèle d'affaires/business model ? ».

a) Selon vous, quels ont été les facteurs de succès de votre startup dans la phase de conceptualisation ? Quels facteurs ont été fondamentaux pour surmonter la phase de conceptualisation et pour pouvoir passer à la phase de démarrage ? Par exemple, quelles pratiques, compétences et/ou ressources ont joué un rôle déterminant dans cette phase ?
b) Au contraire, quels étaient les principaux freins (facteurs inhibiteurs ou restrictifs) pendant la phase de conceptualisation ?

Section 2 - Phase de démarrage (startup)

À ce stade, la startup est prête à commencer à vendre la solution qu'elle a développée, même si c'est dans une version initiale ou allégée, appelée *Minimum Viable Product (MVP)*. L'objectif est de s'assurer que le concept de produit proposé fonctionne comme prévu et que les prototypes initiaux soient alignés avec les besoins du marché. En plus du démarrage des opérations, à ce moment, il est également courant de présenter l'entreprise aux investisseurs et de participer à des programmes pour le développement des startups.

a) A partir de votre expérience, quels ont été les facteurs de succès de votre startup dans la phase de démarrage (startup) ? Quels facteurs ont été fondamentaux pour surmonter cette phase et commencer le processus d'escalade (scale-up) de l'entreprise ? Par exemple, quelles pratiques, compétences et/ou ressources ont joué un rôle déterminant dans la phase de démarrage ?
b) Au contraire, quels étaient les principaux freins (facteurs inhibiteurs ou restrictifs) à ce stade ?

Section 3 - Phase d'escalade (scale-up)

Dans la phase d'escalade la startup structure son organisation et son modèle d'affaires afin d'atteindre un développement constant et exponentiel, que ce soit en termes de revenus, de ventes ou de nombre de clients. Cette phase représente, en général, le sommet du développement des startups.

c) Selon vous, quels ont été les facteurs de succès de votre startup dans la phase d'escalade ? Quels facteurs ont été fondamentaux dans la structuration de ce processus ? Par exemple, quelles pratiques, compétences et/ou ressources sont essentielles dans cette phase ?
d) Au contraire, quels étaient les freins (facteurs inhibiteurs ou restrictifs) à ce stade ?

Section 4 – Capacités critiques de performance (seulement l'interroger si le répondant ne mentionne rien à ce sujet)

Capacité 1 : Capacité de mise en réseau. Cette capacité reflète les compétences de votre équipe à mobiliser et à appliquer les ressources issues de vos réseaux et de vos contacts, formels et informels. Pourriez-vous nous en dire plus ou nous donner des exemples sur :

- Les pratiques de votre équipe pour construire des liens/collaborations.
- Le rôle des relations personnelles dans l'acquisition de ressources financières et humaines.
- Les pratiques de votre équipe pour résoudre les problèmes et créer des solutions collaboratives avec vos partenaires.

a) Selon vous, ces pratiques constituent un différentiel pour votre entreprise ? A quelle phase de développement de votre entreprise (conceptualisation, démarrage ou escalade), cette capacité serait plus importante ?

Capacité 2 : Capacité technologique. Cette capacité se réfère aux compétences de votre équipe pour l'amélioration des produits/services, l'utilisation des connaissances techniques pour le développement de nouveaux produits/services, ou d'autres compétences utiles au développement technologique. Pourriez-vous nous en dire plus ou nous donner des exemples sur :

- Les pratiques de l'entreprise pour conduire des projets de R & D et pour l'amélioration des connaissances et des compétences.
- L'efficacité de votre équipe dans l'utilisation des connaissances techniques et quels sont les résultats de R & D pour le développement (ou la mise à niveau) de nouveaux produits ou services.

a) Selon vous, ces pratiques constituent un différentiel pour votre entreprise ? A quelle phase de développement de votre entreprise (conceptualisation, démarrage ou escalade), cette capacité serait plus importante ?

Capacité 3 : Capacité de commercialisation. Cette capacité reflète les compétences de votre équipe à identifier les besoins du marché, à établir correctement les prix, à attirer et à fidéliser les clients, à la mise en valeur des différents partenaires / canaux de vente, etc. Pourriez-vous nous en dire plus ou nous donner des exemples sur :

- L'efficacité de votre équipe pour s'assurer que les efforts liés aux produits répondent aux besoins des clients.
- Les pratiques de votre entreprise pour développer des campagnes de publicité et de promotion de ventes.
- L'efficacité de votre équipe pour mettre en valeur les membres des canaux de vente et de distribution (par exemple, les distributeurs, les détaillants et les grossistes).
- Les pratiques de votre équipe pour bien gérer les relations commerciales.

a) Selon vous, ces pratiques constituent un différentiel pour votre entreprise ? A quelle phase de développement de votre entreprise (conceptualisation, démarrage ou escalade), cette capacité serait plus importante ?

Capacité 4 : Capacité d'innovation. Cette capacité reflète les compétences de votre équipe à adopter de nouvelles idées, de nouvelles façons de faire, à être créatif dans les méthodes de production, à gérer les risques et les incertitudes liés à l'innovation, et celles liées au lancement de nouveaux produits ou services (être le premier/leader, fréquence de lancement). Pourriez-vous nous en dire plus ou nous donner des exemples sur :

- L'efficacité de votre équipe dans la fréquence de lancement de nouveaux produits/services.
- Les pratiques pour trouver de nouvelles manières de faire leurs activités.
- Les pratiques pour gérer les risques et les incertitudes liés aux activités innovantes.

a) Selon vous, ces pratiques constituent un différentiel pour votre entreprise ? A quelle phase de développement de votre entreprise (conceptualisation, démarrage ou escalade), cette capacité serait plus importante ?

Capacité 5 : Capacité dynamique basée sur la connaissance. Cette capacité reflète l'aptitude de votre équipe à acquérir, à créer et à combiner des connaissances externes qui soient utiles à votre activité. Pourriez-vous nous en dire plus (ou nous donner des exemples) sur :

- Les pratiques de votre équipe pour acquérir de nouvelles connaissances et pratiques, à travers la combinaison et l'application des connaissances existantes dans l'entreprise avec les connaissances acquises à l'extérieur.
- Les pratiques de votre équipe dans la coordination des réseaux internes et externes pour combiner efficacement les connaissances (internes et externes).

  a) Selon vous, ces pratiques constituent un différentiel pour votre entreprise ? A quelle phase de développement de votre entreprise (conceptualisation, démarrage ou escalade), cette capacité serait plus importante ?

Section 5 - L'importance de l'écosystème de connaissances

a) Faites-vous appel aux universités ou aux centres de recherche pour accéder à des connaissances importantes pour votre entreprise ? Si oui, quels types de connaissances avez-vous acquis auprès de ces partenaires ? Pourriez-vous donner des exemples sur comment votre entreprise a acquis et a appliqué des connaissances externes essentielles à son développement dans chacune des phases (conceptualisation, démarrage ou escalade).

   Types de connaissances (à usage interne, si nécessaire) :

   6. Connaissances techniques.
   7. Connaissances de gestion.
   8. Connaissances de marché.
   9. Connaissances de processus et méthodes de production.
   10. Autres connaissances ou expertises.

b) Si le répondant ne parle d'aucun de ces canaux, posez des questions sur l'importance de :

   15. CH01 - Contrats de R&D
   16. CH02 - Services et conseils
   17. CH03 - Projets conjoints de R&D

18. CH04 - Accords de transfert de technologie
19. CH05 - Formation RH (*pour les gestionnaires de la startup, finance, tributaire, etc.*)
20. CH06 - Publications conjointes
21. CH07 - Co-direction des thèses
22. CH08 – Stages/Emplois d'étudiants
23. CH09 – Recrutement de chercheurs/fellows en entreprise
24. CH10 - Participation conjointe à des conférences
25. CH11 - Création de réseaux de chercheurs et de practiciens
26. CH12 - Licences de propriété intellectuelle
27. CH13 - Développement de startups (*incubation, pré-incubation, startup weekend, etc.*)
28. CH14 – Développement de spin-offs

c) L'accès aux connaissances des universités/centres de recherche a été plus important à une phase spécifique du développement de l'entreprise (conceptualisation, démarrage ou escalade) ? Pourquoi ?

***Dernières questions* :** Seriez-vous disponible pour participer à d'autres interviews ? Auriez-vous de recommandations de dirigeants de startups agtech pouvant être intéressés à participer de cette étude ?

Section 6. Profil de l'entreprise et du répondant

4. Date de l'entretien : ___/___/______ (jj/mm/aaaa)

5. Profil Agtech (prérequis) :

a) La société est-elle indépendante des grandes entreprises (*non-spinoff company*) ?

☐Oui ☐Non

b) L’entreprise a-t-elle réussi ou se trouve en phase d’escalade ?

☐Oui ☐Non

c) Année de fondation d’entreprise : ______ (aaaa)

d) Nombre de salariés: ______

e) Marché (vous pouvez sélectionner plus d’une option) :

IV. Avant l’exploitation agricole (en amont) :

☐ Analyse en laboratoire

☐ Crédit, swap, assurance, crédits carbones et analyse fiduciaire

☐ Engrais, inoculant et nutrition des plantes

☐ Génomique et reproduction animale

☐ Marché des intrants agroalimentaires

☐ Nutrition et santé animale

☐ Semences, semis et génomique végétale.

V. Dans l’exploitation agricole :

☐ Apiculture et pollinisation

☐ Connectivité et télécommunications

☐ Contenu, Éducation, Médias sociaux

☐ Lutte biologique et lutte intégrée contre les ravageurs

☐ Drones, machines et équipements

☐ Économie partagée

☐ Gestion des déchets agricoles

☐ IOT pour l’agro : détection des ravageurs, sol, climat et irrigation

☐ Météorologie et irrigation et gestion de l’eau

☐ Plateforme d’intégration de systèmes, solutions et données

☐ Télédétection, diagnostic et surveillance d'images

☐ Système de gestion des propriétés rurales

☐ Télémétrie et automatisation

VI. Après l'exploitation agricole (en aval) :

☐ Aliments innovants et nouvelles tendances alimentaires

☐ Stockage, infrastructure et logistique

☐ Biodiversité et durabilité

☐ Bioénergie et énergies renouvelables

☐ Cuisine dans le nuage et cuisine fantôme

☐ Industrie alimentaire et transformation 4.0

☐ Marchés et plateformes pour le commerce et la vente de produits agricoles

☐ Épicerie en ligne

☐ Plantation urbaine : usine végétale et nouvelles formes de plantation

☐ Restaurants en ligne et kit de repas

☐ Sécurité alimentaire et traçabilité

☐ Gestion de magasin et services alimentaires

☐ Emballage, environnement et systèmes de recyclage

6. Profil du répondant :

i) **Nom, Prénom :** _____

j) **Âge : _______**ans

k) **Temps dans l'entreprise : _______**ans

l) Genre :

☐ Femme

☐ Homme

☐ Je préfère ne pas déclarer

m) Niveau d'éducation (complet) :

☐ École primaire

☐ Collège

☐ Licence/Bachelor

☐ Spécialisation ou MBA

☐ Master

☐ Doctorat/Post-doctorat

n) Domaine de connaissances :

☐ Sciences exactes

☐ Biologie

☐ Sciences de l'Ingénierie

☐ Santé

☐ Agronomie

☐ Linguistique, lettres et arts

☐ Sciences humaines et sociales

o) Expérience précédente (avant la création de la startup) :

a. Expérience dans le même secteur de l'entreprise actuelle : _______ans
b. Expérience en gestion : _______ans
c. Expérience en tant que propriétaire ou partenaire d'autres entreprises : _______ans

p) Responsabilité dans l'entreprise actuelle :

☐ Partenaire/Associé

☐ Dirigeant/Gérant

☐ Les deux (associé et dirigeant)

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