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THE CONCEPT OF PIVOTAL HELIX IN INTERNATIONALISATION ECOSYSTEMS AND THE ROLE OF EXPORT PROMOTION AGENCIES: A GROUNDED THEORY APPROACH

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1. Introduction

Internationalisation, according to established international business theories, encompasses increased participation in global markets through mechanisms such as foreign direct investment (FDI), joint ventures, initial public offers (IPOs), technology exchange, and exports (Costa, Calazans, Andrade & Araújo, 2024; Hult, Gonzalez-Perez & Lagerström, 2020; Knight and Liesch, 2016). This phenomenon spans various organisational categories, including small and medium-sized firms (SMEs), multinational corporations (MNEs), universities, technological centres, government agencies, and civil society representatives, creating a complex and dynamic ecology that involves both local and international stakeholders (Luo, 2021; Sekliuckiene, Sedziniauskiene & Viburys, 2016; Distefano, Gambillara & Di Minin, 2016).

The expansion of internationalisation gives rise to the concept of a global business ecosystem, defined as a network of organisations situated worldwide, some forming large clusters, interconnected in producing and delivering products, technologies, and services to a global market, thus generating global value (Luo, 2021).Such ecosystems, unique in their nature, have been shown to boost competitiveness through networking with domestic and international partners, knowledge sharing, and intercultural development, resulting in higher levels of entrepreneurial activity and innovation within and outside of regional, national, and international organisations (Henn et al., 2022; Tekin, Ramandani, & Dana, 2021; Odei & Stejskal, 2020).

The Brazilian Agency for the Promotion of Exports and Investments (ApexBrasil) is tasked with promoting Brazilian products and services abroad and attracting foreign investors. Established in 1998, initially as part of the Brazilian Support System for Micro and Small Enterprises (SEBRAE), it became an autonomous social service in 2003, operating as a private entity and integrated into the System S (System S - Law No. 10.668/03) (Costa, Cavalcanti, Fernandes & Araújo, 2022; Alcaraz & Zamilpa, 2017).

ApexBrasil plays a pivotal role in developing networks capable of mobilising private and public agents from various spheres and competencies in an integrated effort to expand Brazilian businesses internationally. This engagement involves stakeholders such as trade associations, industrial consortia, educational institutions, research centres, and business incubators (Monticelli, Calixto,Vasconcellos & Garrido, 2017; Farias & Miranda, 2016; Farias & Tatsch, 2014).

Whilst existing research has diligently examined the correlation between internationalisation, support mechanisms for internationalisation, and overall company performance (e.g. Theodoraki & Catanzaro, 2021), significant gaps persist in the specialised literature (Costa et al., 2022). These gaps are notably evident in the domain of business ecosystems, with a specific emphasis on internationalisation and the intricate ways in which diverse entrepreneurial ecosystems transcend geographical confines. This extends beyond conventional connections linking companies solely to product markets (Costa et al., 2024; Rong, Kang & Williamson, 2022; Hult, Gonzalez-Perez & Lagerström, 2020; Sørensen & Hu, 2014). Furthermore, a substantial gap exists in the literature concerning the role and influence of ApexBrasil within internationalisation ecosystems, underscoring the imperative for further exploratory studies to fill these knowledge gaps (Costa et al., 2022; Monticelli et al. 2017).

Therefore, the current work endeavours to comprehensively analyse the institutional role of ApexBrasil in the Brazilian internationalisation ecosystem, identifying emerging patterns, meaningful relationships, and unexplored perspectives. The primary research question

guiding this study is: "How does ApexBrasil influence and shape the internationalisation processes of Brazilian businesses within the internationalisation ecosystem?".

2. Theoretical Framework

Internationalisation is conceptually perceived as the strategic process through which organisations expand their operations and influence beyond domestic borders to engage in international markets, involving activities such as establishing foreign subsidiaries, forming strategic alliances, engaging in cross-border mergers and acquisitions, exporting products and services, and leveraging international partnerships (Costa et al., 2024; Hult, Gonzalez-Perez & Lagerström, 2020, Knight & Liesch, 2016).

This phenomenon includes a diverse range of entities, from SMEs to multinational enterprises (MNEs), universities, technology centres, government agencies, and civil society representatives, creating a complex and dynamic ecosystem (Cha, Kotabe & Wu, 2023; Costa, 2022; Baier-Fuentes, Guerrero & Amorós, 2021).

Factors such as trade liberalisation, digital business models, technological innovations, FDI accessibility, and social media have made internationalisation crucial for business growth and competitiveness (Henn et al., 2022; Alcaraz & Zamilpa, 2017; Knight and Liesch, 2016). The evolution of internationalisation leads to the concept of global business ecosystems – networks of organisations worldwide, interconnected to produce and deliver products, technologies, and services globally, thus creating global value (Luo, 2021; Nambisan, Hult, Gonzalez-Perez & Lagerström, 2020; Nambisan, Zahra & Luo, 2019). These ecosystems enhance competitiveness through networking, knowledge sharing, and intercultural development, fostering entrepreneurial activity and innovation across regional, national, and international levels (Henn et al., 2022; Tekin et al., 2021; Odei & Stejskal, 2020).

Fundamentally, the concept of ecosystems originally pertains to the interaction and interdependence of biotic (living organisms) and abiotic (physical environment) factors. This concept has been adapted to the business environment to study the co-effect and co-evolution of organisations and their external environment. This adaptation explains how different actors, both institutions and individuals, within a non-centrally organised economic community co-exist, thrive, innovate, cooperate, and compete through informal arrangements (Hewett et al., 2022; Rasmussen & Petersen, 2017).

The business ecosystems concept surpasses conventional paradigms such as clusters, marketing ecosystems, and global value chains. It incorporates diverse stakeholders, including social networks, research institutions, regulatory bodies, and civil society representatives (Cha, Kotabe & Wu, 2023; Hewett et al., 2022; Parente, Geleilate & Rong, 2018). Acknowledged as a paradigmatic framework for comprehending business dynamics and interactions (Cha, Kotabe & Wu, 2023; Rong, Kang & Williamson, 2022; Jacobides, Cennamo & Gawer, 2018; Adner, 2017), it integrates entrepreneurial, innovation, and digital ecosystem perspectives (Ferreira, Fernandes & Veiga, 2023; Tippmann et al., 2023; Nambisan, Zahra & Luo, 2019).

The concept of entrepreneurial ecosystems, widely acknowledged in specialised literature, encapsulates dynamic interactions amongst diverse actors, organisations, and processes within a given region, fostering the creation, growth, and scaling of new businesses, along with economic, technological, and social development (Zahra & Hashai, 2022; Van Schijndel, 2019). Although there is a growing exploration of internationalisation within the context of entrepreneurial ecosystems, a systematic examination of entrepreneurial internationalisation, particularly concerning internationalisation support ecosystems (ISE) and cross-border connections, remains less clear (Theodoraki & Catanzaro, 2021; Van Schijndel, 2019).

Innovation ecosystem, in its turn, is intricately linked to entrepreneurship, fostering collaborative arrangements for knowledge and technology exchange amongst diverse actors,

including organisations, businesses, research centres, and policymakers (Tippmann et al., 2023; Costa, 2022; Champenois & Etzkowitz, 2018; Sekliuckiene, Sedziniauskiene & Viburys, 2016). These ecosystems encompass diverse domains such as science and technology, venture capital, innovative infrastructure, innovation demand, legislative framework, and human capital (Costa, 2022; Roig, Sun-Wang & Manfredi-Sánchez, 2020; Odei & Stejskal, 2020; Rasmussen & Petersen, 2017).

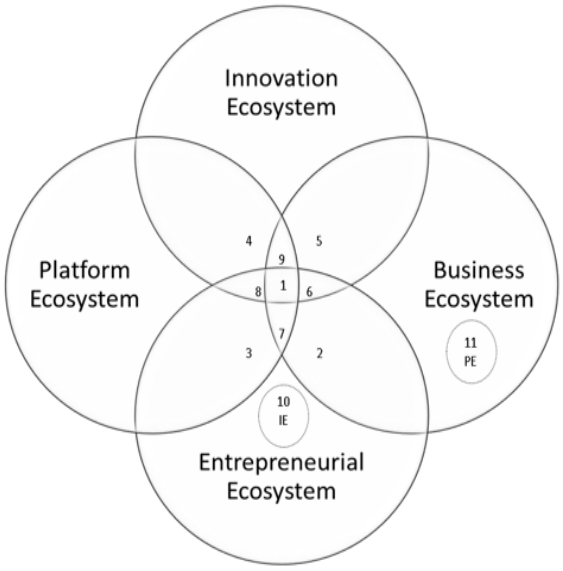
The triple helix framework (Etzkowitz, & Leydesdorff, 2000), emphasising collaboration between universities, industries, and government, proves instrumental in driving innovation and economic development within such ecosystems (Baier-Fuentes, Guerrero & Amorós, 2021; Sørensen & Hu, 2014). This model extends to include civil society as a fourth helix, exerting influence on knowledge-based collaboration and open innovation (Distefano, Gambillara & Di Minin, 2016; Leydesdorff, 2012).

Digitalization stands as a pivotal driver of globalisation and the expansion of international business, providing diverse actors, from SMEs to MNEs, with the means to partake in cross-border transactions through innovative platform-based models (Brouthers, Chen, Li, Shaheer, 2022; Nambisan, Zahra & Luo, 2019; Yonatany, 2017). The advent of Digital Platform Ecosystems (DPEs) has brought about a paradigm shift in business dynamics, fostering seamless collaboration and value creation across organisational and geographical boundaries (Ciasullo, Montera, Mercuri, and Mugova, 2022).Within this context, the processes of digital transition and the adoption of platform-based models fundamentally influence the landscape of global entrepreneurship, dictating how businesses enter foreign markets and collaborate for value creation (Hewett et al., 2022; Tatarinov, Ambos & Tschang, 2022; Ratten, 2021).

The conceptual framework guiding the present study (Costa et al., 2024) adopts an internationalisation ecosystem perspective, integrating four interrelated ecosystem concepts and its variants as presented in Figure 1:

Figure 1
Internationalisation Ecosystem Core Concept

1 Core Internationalization Ecosystem Model
2 MNE/SME Integration Ecosystem
3 New Digital Business Ecosystem
4 Open Digital Innovation Ecosystem
5 TH Model and Variants Ecosystem
6 TH Model and Variants Ecosystem
7 Digital Business Ecosystem
8 Digital TH Model and its Variants Ecosystem
9 Digital TH Model and its Variants Ecosystem
10 Digital Incubation/Acceleration Ecosystem
11 Digitalization Ecosystem



Source: Costa et al. (2024)

These ecosystemic arrangements exhibit varying degrees of interconnectedness, and each underscores internationalisation as a pivotal strategy for organisational survival and expansion. Consequently, one can posit that the notion of internationalisation ecosystems

incorporates components from the other ecosystems examined, serving as a central integrative concept as presented by Costa et al. (2024). Moreover, it can be contended that each ecosystem possesses a distinctive nature contingent upon environmental characteristics and actor interrelations. Nevertheless, by identifying shared characteristics inherent in diverse ecosystem concepts, one can propose distinct typologies of ecosystems, each bearing a unique relationship to the internationalisation process, as illustrated in Figure 1.

The Integration seen in Figure 1 contributes to the intricate structure of an internationalisation ecosystem. Business Ecosystems form the economic foundation, fostering collaboration amongst diverse entities, including traditional industries, multinational enterprises, and clusters. Entrepreneurial Ecosystems focus on innovation and high-growth ventures, injecting dynamism into the ecosystem by nurturing startups and non-traditional business models. Innovation Ecosystems broaden the perspective beyond the economic sphere, emphasising knowledge creation and exchange, essential for fostering adaptability and competitiveness. Lastly, Platform Ecosystems, with their digital focus, facilitate advanced technology, knowledge transfer, and collaboration, providing a transformative layer to the internationalisation ecosystem. Together, these interrelated ecosystems create a synergistic environment, wherein economic, innovative, and digital dimensions harmonise to shape the complexities of international business interactions and expansion, each with specific characteristics but prone to rapid transformation.

2.1 Export Promotion Programs and Internationalisation Ecosystems

Export Promotion Programs are focused on information, training, trade mobility and financial aid (Costa et al., 2022; Dornelas & Carneiro, 2018; Monticelli et al., 2017), emphasising internal development, international competitiveness, and image promotion (Bianchi & Figueiredo, 2017). These programs offer services like market research, marketing campaigns, financing projects, participation in fairs, sector consultancies, and promotion through conventions and business meetings (ApexBrasil, 2020a, 2020b; Ribeiro, Figueiredo & Forte, 2020; Dornelas & Carneiro, 2018).

Since its creation in 1997, the Brazilian Export Promotion Agency (ApexBrasil) has supported numerous export consortia, enhancing Brazil's export culture and international expansion, impacting international insertion, market consolidation, and operation expansion stages (Costa et al., 2022; Monticelli et al., 2017; Farias & Tatsch, 2014). ApexBrasil enhances Brazilian enterprises' competitiveness through sector-specific initiatives, trade promotion, internationalisation training, and support for research and asset investments (Ribeiro, Figueiredo & Forte, 2020; Monticelli et al., 2017; Bianchi & Figueiredo, 2017; Farias & Miranda, 2016).

ApexBrasil also plays a key role in attracting FDI, especially since Brazil lagged behind competitors like China and India in innovation-intensive and export-oriented investment during 1990-2010 (Costa et al., 2022; Alcaraz & Zamilpa, 2017). It is instrumental in bilateral agreements (Fouad & Gouvea, 2018). Better qualified companies perform better internationally, leading to improved internal competencies, thus ApexBrasil significantly impacts the internal market by promoting best practices in market intelligence, entrepreneurial training, and FDI attraction strategies (Cruz, Bussolo & Iacovone, 2018).

Despite its significance, previous studies (Costa et al., 2022) have noted that ApexBrasil is not systematically studied by academics, leaving room for exploratory studies on its institutional role in the Brazilian internationalisation ecosystems, which is the focus of the current research..

3. Methodology

The research adopted a methodological procedure following three major steps: i) definition of the case selection rationale; ii) development of data collection methodology; and iii) definition of data analysis strategy, including the data codification format (Rong, Kang & Williamson, 2022, Yin 2017).

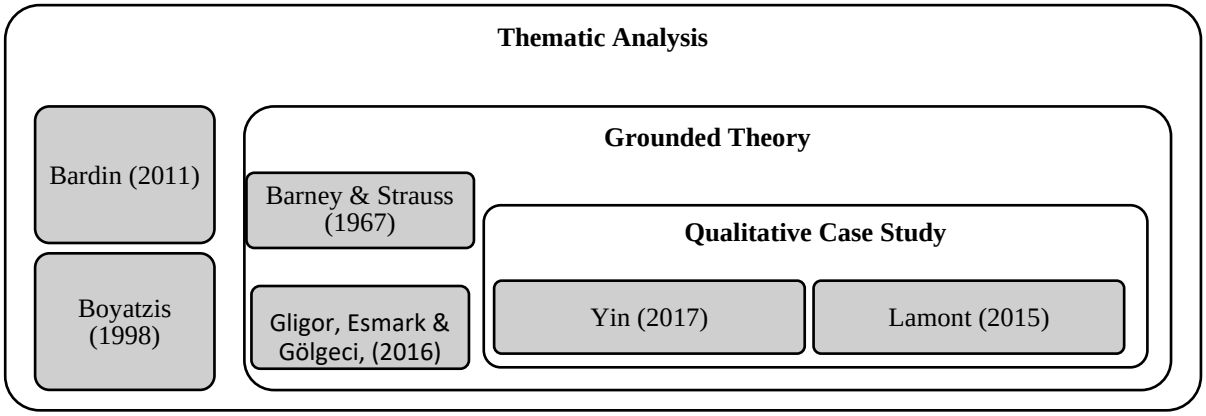
The qualitative approach was based on the fact that such methodology is well-suited to understand complex contemporary phenomena that are difficult to separate from their context, being already widely employed in IB Research, yielding a high level process oriented details to depict real-world phenomena and incorporate them into the theory, which serves the exploratory purpose of this research (Tatarinov, Ambos & Tschang, 2022; Ciasullo et al., 2022; Creswell & Creswell, 2018).

A Systematic Literature Review supported by a Content and Thematic Analysis (Denyer & Tranfield, 2009; Tranfield, Denyer & Smart, 2003) was carried out by Costa et al. (2024), between June, 2022 to January, 2023, to identify in the current literature the different types of research and approaches taken to understand internationalisation from an ecosystemic perspective. The Literature review was complemented by corporate reports, handbooks, and brochures provided by ApexBrasil or accessed via its corporate website and social networks (Costa et al., 2022; ApexBrasil 2020a, 2020b).

The data underwent a comprehensive study, employing content and thematic analysis techniques (Guest, MacQueen & Namey, 2012; Bardin, 2011; Boyatzis, 1998) alongside Grounded Theory methodology (Roig, Sun-Wang & Manfredi-Sánchez, 2020; Gligor, Esmark & Gölgeci, 2016; Glaser & Strauss, 1967). This analytical approach involved conducting in-depth interviews with key stakeholders within ApexBrasil. Additionally, secondary data analysis comprised documental scrutiny of pivotal publications, notably the Integrated Management Reports from 2018 and 2020 and the Strategic Report spanning 2020 to 2023. Official publications on the ApexBrasil site were also considered as primary sources for a thorough examination, grounding the findings within real-world contexts (Van Schijndel, 2019; Creswell & Creswell, 2018). Details of the research structure can be seen in Figure 2:

Figure 2

Research Structure



Source: Elaborated by the author

The choice of a case study methodology was made based on its common usage in social sciences to get in depth cumulative knowledge about specific phenomena, addressing the questions formulated in the research, whilst identifying the dynamics of phenomena's development, clustering complex information (Creswell & Creswell, 2018; Yin, 2017; Lamont, 2015). It was alto taken into account the incompleteness of the framework on internationalisation ecosystems and its early stages development (Costa et al., 2024; Theodoraki

& Catanzaro, 2021), which makes the case study approach advisable in business studies (Creswell & Creswell, 2018).

3.1 Data Collection

Primary data was collected through semi-structured, in-depth interviews with nine senior representatives from ApexBrasil, conducted between June and September 2023. The research instrument comprised 50 open questions, allowing flexibility for follow-up queries and adaptation to emerging themes (Theodoraki & Catanzaro, 2021; Sekliuckiene, Sedziniauskiene & Viburys, 2016; Bardin, 2011). The interviews, conducted virtually via Google Meet and Microsoft Teams, totaled 415 minutes, with an average duration of 46 minutes, and yielded 59,730 transcribed words across 148 A4 pages. The average length of interviewees' service at ApexBrasil was 11.5 years, spanning areas such as Institutional and Governmental Relations, Competitiveness, Investment, Market Intelligence, Regional Management, International Expansion, Agribusiness, Industry and Services, and Qualification.

The original sample was purposive, facilitated by Fala.BR (CGU, 2023), to ensure alignment with the research's objectives and areas (Costa et al., 2024; Costa et al., 2022). Despite one individual not being interviewed, another participant was included through recommendations, introducing a minor snowballing element (Creswell & Creswell, 2018). The interviews were transcribed using the Cockatoo Transcription Service.

3.2 Data Analysis

To ensure flexible data interpretation, Content and Thematic Analysis was conducted in two stages. First, a priori categories were created from the literature review data (Costa et al., 2024) following protocols by Guest, MacQueen, and Namey (2012) and Boyatzis (1998). Second, a posteriori categories were developed based on interview results using inductive reasoning (Bardin, 2011). Combining deductive and inductive reasoning integrated theoretical insights with practical perspectives (Gligor, Esmark & Gölgeci, 2016; Barney & Strauss, 1967).

Data from interviews were analysed individually and then compared to minimise subjectivity (Bardin, 2011). The identification of themes captured significant data aspects related to the research question (Ciasullo et al., 2023; Guest, MacQueen & Namey, 2012). Thematic analysis identified patterns from transcribed conversations, reflecting shared experiences (Creswell & Creswell, 2018; Guest, MacQueen & Namey, 2012).

The thematic analysis enabled the identification of recurrent patterns of experiences drawn from transcribed conversations, potentially stemming from shared experiences and perspectives amongst the interviewees (Creswell & Creswell, 2018; Guest, MacQueen & Namey, 2012).

The coding process was iterative, involving classification, testing, and redefinition of data through critical analysis for in-depth codification (William & Moser, 2019; Bardin, 2011; Boyatzis, 1998). Codifications were saved on an Excel2013 spreadsheet for descriptive statistical analysis. Additionally, Iramuteq (*Interface de R pour les Analyses Multidimensionnelles de Textes et de Questionnaires*), version 0.7 alpha 2 and ChatGPT-4 checked the interaction between excerpts and codification, reducing subjectivity (Morgan, 2023; Hamilton et al., 2023; Mesquita, 2022). Table 1 displays the techniques utilised for the content and thematic analysis:

Table 1
Thematic and Content Analysis

Technique	Objective	Means
***A priori* Categorization**	Applying pre-existing categories or predetermined coding schemes to	Calculating means, frequencies, or percentages for each predefined category to summarise and describe the content.

	systematically analyse and interpret textual data.	
***A Posteriori* Categorization**	Identifying patterns, themes, or trends within the data that may not have been anticipated beforehand.	Continuously comparing new data with existing data to refine categories and identify similarities and differences. It contributes to the ongoing development of categories as the analysis progresses.
Hierarchical Descendant Classification (HDC)	Obtaining word categories from segments of texts that are similar to each other and different from other categories.	Through lemmatization and chi-square test, the relationship between word classes in a corpus is presented, given their (i) percentage composition and (ii) statistical significance ($\chi 2$) in the corpus; Its reading is done from left to right
Similarity Analysis	Establish the relationship of co-occurrences among clusters of statistically significant words.	Word occurrences are presented based on the arrangement of their categories within a specific order of importance from the centre to the periphery.
Confirmatory Analysis	Validating or confirming existing theories, concepts, or hypotheses through systematic coding and analysis of the data.	The model's ability to process and understand textual information allows it to aid in the validation of existing theories, offering a tool for systematic and structured analysis that aligns with confirmatory research objectives.

Source: Based on Morgan (2023); Mesquita (2022); Guest, MacQueen and Namey (2012) ; Bardin (2011) and Boyatzi, (1998).

Through these techniques, the automated software itself was capable of generating word clusters characterised by internal homogeneity and external heterogeneity, whose cohesion levels are measured through the analysis of χ^2 (chi-square) and p-value <0.0001 of the words contained in these clusters. These two metrics constitute the pillars of the Reinert Method and serve as logical instruments designed to conceive the correlation between the terms that make up the text segments. This approach allows delimiting the scope of the corpus and evaluating the intensity of term presence in different clusters of a single corpus. Nonetheless, it is crucial to emphasise that, regardless of the complexity level of the technique employed with IRAMUTEQ, the results can only be analysed through a theoretically informed interpretation and in consideration of the context in which the actors are situated(Mesquita, 2022, Sousa et al., 2020).

Data were continually analysed to refine the interview protocol for subsequent interviews (Ratten, 2021; Creswell & Creswell, 2018). This allowed for a posteriori codification (Bardin, 2011) as themes emerged, connecting to existing literature. Concentrating on primary themes helped uncover emerging issues, comparing new issues with other informant data, and revealing patterns to understand ApexBrasil's role in the Brazilian internationalisation ecosystem (Gligor, Esmark & Gölgeci, 2016).

The coding processes supported the grounded theory approach, enabling researchers to refine themes and develop theories in qualitative research (Williams & Moser, 2019).

4. Results & Discussions

4.1 Constructs and codification

The research based on Costa et al. (2024) resulted in a set of *a priori* categories composed of four main constructs or Macro-Categories: Business Ecosystems; Entrepreneurial Ecosystems, Innovation Ecosystems and Platform Ecosystems. Those constructs were composed of 13 Meso-Categories , totalling 41 Micro-Categories, each with its corresponding code, as presented in Table 2 alongside the frequency of each code in the interviews:

Table 2

Internationalisation Ecosystem Constructs – a priori categories

Macro Category	Meso Category	Micro Categories	Codes	Frequency %	Total
Business Ecosystem	Business strategy	Resource-Based View	(BE BS RBV)	2,51%	42,73%
		Transactional Costs	(BE BS TC)	0,90%	
		International Ambidexterity	(BE BS IAB)	1,08%	
		Dynamic Capabilities	(BE BS DC)	3,59%	
		Strategic Alliances	(BE BS SA)	11,67%	
		Knowledge-based View	(BE BS KBV)	3,41%	
	Clusters	Regional Clusters	(BE CTs RCTs)	2,69%	
		Public Policies	(BE CTs PP)	1,44%	
	Networking, supply chain and knowledge sharing	Knowledge Transfer	(BE NS KT)	7,00%	
		Supply Chain Management	(BE NS SC)	2,69%	
	Foreign Direct Investment	Cross-Border Venture Capital Investments	(BE FDI CBV)	5,03%	
		Mergers & Acquisitions	(BE FDI M&A)	0,72%	
Entrepreneurial Ecosystem	Entrepreneurial activity	Local Support Ecosystems	(EE EA LSE)	6,28%	25,31%
		Economic Resilience	(EE EA ER)	0,18%	
		Entrepreneurship Policies	(EE EA EP)	0,90%	
	International Entrepreneurship	Mixed Embeddedness Theory	(EE IE MET)	0,18%	
		Ecosystem Integration	(EE IE Eint)	1,62%	
		Transnational Entrepreneurship	(EE IE TE)	4,13%	
	Academic Entrepreneurship	Entrepreneurial Education	(EE AE Eed)	1,44%	
		Technology-Based University Spin-Offs	(EE AE T-USOs)	0,18%	
		Business Incubators and Accelerators	(EE AE BIAs)	1,44%	
	Entrepreneurial organisations	Small and Medium Organizations	(EE EO SMEs)	2,51%	
		Startups and Scaleups	(EE EO STSC)	4,31%	
		Born Global Firms	(EE EO BG)	1,26%	
		Multinational Enterprises	(EE EO MNE)	0,90%	
Innovation Ecosystems	Triple and Quadruple Helix	University - Industry Collaboration	(IE THx UEC)	2,87%	5,92%
		Innovation Networks	(IE THx IN)	0,72%	
		Entrepreneurial Discovery Process	(IE THx EDP)	0,18%	
		Innovation Policies	(IE THx InP)	0,18%	
	Innovation Strategy	Open Innovation	(IE IS OI)	0,72%	
		Smart Specialisation	(IE IS SS)	0,18%	
		National Innovative Systems	(IE IS NIS)	0,18%	
	Innovative Organisations	Research Technology Organizations	(IE IOs RTOs)	0,54%	
		HEIs 3rd Mission	(IE IOs HEI)	0,36%	
Platform Ecosystems	Digital Transition and Digitization	Digital Servitization	(PE DTD DS)	0,36%	20,47%
		Digital Transformation	(PE DTD DT)	3,77%	
		Digital Economy	(PE DTD DE)	2,15%	
	Digital Ecosystems	E-Commerce and E-Marketing	(PE DE e-cm)	3,59%	

		Omnichannel Strategy	(PE DE OMS)	0,72%	
		Digital Business Models	(PE DE DBM)	1,26%	
		Enabling Technologies	(PE DE Dtech)	1,80%	

Source: Elaborated by the authors based on Costa et al. (2024).

The semi-structured interviews were based on those dimensions, through content and thematic analysis. Some new themes were also found repeatedly in several interviews, forming a set of a posteriori categories encompassing a Macro-Category composed of six Meso-Dimensions, totalling 13 Micro-Categories, each with its correspondent code, not seen in Costa et al. (2024). Details about *a posteriori* categories are presented in Table 3:

Table 3

Internationalisation Ecosystem Constructs – a posteriori categories

Macro Category	Meso Category	Micro Categories	Codes	Frequency %	Total %
ApexBrasil	Networking, supply chain and knowledge sharing	Key Companies	(APEXB NS KC)	0,18%	11,85%
		Regional Development	(APEXB NS RegD)	0,18%	
	Advanced Technology	Transport Technology	(APEXB AT TT)	0,36%	
		Aggrotech	(APEXB AT Agtec)	0,54%	
	Business Strategy	Gender	(APEXB BS Gen)	1,08%	
		Institutional Barriers	(APEXB BS IB)	2,33%	
		Operational Barriers	(APEXB BS OB)	1,80%	
	Triple and Quadruple Helix	Presidential Diplomacy	(APEXB THx PD)	0,36%	
		Environmental Social and Governance	(APEXB THx ESG)	1,62%	
		Brazilian S System	(APEXB THx SiS)	1,26%	
	Foreign Direct Investment	Infrastructure	(APEXB FDI INF)	0,18%	
	International Entrepreneurship	Export Culture	(APEXB IE Cexp)	1,62%	
		Tele Emigrants/ Immigrants	(APEXB IE Tim)	0,36%	

Source: Elaborated by the authors based on Costa et al. (2024).

The *a posteriori* categories and its codification represent themes that were found in the interviews and had no direct correspondence with the themes found in the previous SLR (Costa et al., 2024); developing a framework based on the collected data, which was analysed on a continual basis modelling the original interview protocol and expanding its scope, whilst unveiling some new themes that stood out due to their relevance. These new codes were compared to other informant data as well as the SLR data, creating a new Macro-Category (ApexB), very specific to ApexBrasil *modus operandi* and the very perception of their collaborators, which allow for the theorization of its role in the Brazilian internationalisation ecosystem. In total, there were 54 codes that occurred 554 times across the *corpus* of the interview.

4.2 Content and Thematic Analysis.

As the broader thematic group, business ecosystems received a total of 42,73% of all codifications, pointing to the major operating areas relevant to ApexBrasil within the proposed internationalisation ecosystems framework (Costa et al. 2024).

From a conceptual standpoint, Resource-Based View (RBV) with 2,51% and Dynamic Capabilities (DC) with 3,59% are frequently discussed, indicating a focus on leveraging internal resources and adapting to changing environments. Strategic Alliances (11,61%) play a significant role, suggesting a reliance on collaborative efforts for business success, placing ApexBrasil as a key player in the ecosystem integration. Regional Clusters (RCTs), with 2,69% – understood as the different Apexbrasil's sectoral projects – are mentioned, reflecting attention to geographic concentrations of interconnected businesses and institutions. Knowledge Transfer (KT) with 7% is also a major theme, emphasising the importance of sharing expertise within networks, which relates to ApexBrasil export qualification programs, especially PEIEX. Cross-Border Venture Capital Investments (CBV) with 5,03% and Mergers & Acquisitions (M&A) with 0,72%, to a considerably lesser extent, are prominent, suggesting an exploration of different forms of FDI for business expansion.

It is possible to infer that ApexBrasil plays a pivotal role in fostering strategic alliances (BE BS SA) and Knowledge Transfer (BE NS KT) indicating its involvement in building collaborative partnerships to enhance Brazil's global presence and possibly pointing out to its main *modus operandi* within the ecosystem.

Entrepreneurial ecosystems were the second most coded thematic category, with 25,31% of codification across the interviews. Local Support Ecosystems (EE EA LSE) is the most recurring code with 6.28%, suggesting a strong emphasis on fostering a supportive local environment for entrepreneurial activities, indicating a focus on community engagement and resources. Transnational Entrepreneurship (EE IE TE) also presents a significant utilisation with 4.13%, it highlights a keen interest in activities that transcend national borders, indicating a global orientation in the entrepreneurial ecosystem with focus on different internationalisation strategies. Albeit ApexBrasil not having an exclusive focus on startups and scaleups, (EE EO STSC) presents a substantial use, with 4.31% of codification, including 1,26% for born global firms (EE EO BG), this code underscores the importance placed on the development and scaling of startups within the entrepreneurial ecosystem, indicating a focus on innovation and growth as well as dynamic internationalisation process. Furthermore, small and medium organisations (EE EO SMEs) with 2,51% are, in fact, the key target of ApexBrasil operations,

The data portrays a significant role ApexBrasil plays in the entrepreneurial ecosystem, valuing local support, global perspectives, educational initiatives, and the growth of startups, underscoring a comprehensive approach to fostering entrepreneurship.

Innovation ecosystems was the least coded Macro-Category with only 5,92% of occurrence. Its key element is university-industry collaboration (IE THx UEC), with 2,87%, there is a strong emphasis on fostering collaboration between universities and industries that is reflected in programs such as PEIEX – The Export Qualification Program, suggesting a significant role in promoting knowledge exchange and partnerships for innovation (Costa et al., 2022). However, no other key Micro-Dimensions played a significant role in the codification. This may open a relevant line of enquiry regarding ApexBrasil role as an innovation driver, given that internationalisation may be perceived as a form of innovation (Costa et al., 2024; Knight, & Liesch, 2016) and also point out to a gap in the literature regarding export promotion agencies and innovation as well as a potential avenue for enquiry regarding innovation networks and entrepreneurial discovery processes, two vital elements for ecosystem internationalisation.

Platform ecosystems was a Macro-Category that had considerable weight not only in the previous SLR (Costa et al., 2024) but also with the responses given by the interviewees, presenting 20,45% of the total codification.

The thematic analysis shows a strong focus on digital transformation, the prominence of codes such as (PE DTD DT) with 3,77% and (PE DTD DE) with 2,51%, indicates a strong emphasis on digitalization and the adoption of digital technologies in the internationalisation process as well as ApexBrasil's internal processes. Furthermore, the significant use of codes like (PE DE e-cm) with 3,59% and (PE DE DBM) with 1,56% suggests a strategic integration of digital platforms for marketing and the development of innovative business models in the internationalisation context.

The data suggests that ApexBrasil's activities and strategies are associated with various aspects of digital transition, digitization, and digital ecosystems. The major subcategories highlight the diverse dimensions of ApexBrasil's involvement in fostering digital aspects within internationalisation ecosystems. The percentage distribution further emphasises the relative importance of each subcategory, providing insights into potential focal areas for ApexBrasil's efforts in promoting internationalisation through digital means.

Finally, with regards to the *a posteriori* categories, found during the interviews, those codes represented almost 12% of all codifications, demonstrating that the thematic scope within ApexBrasil goes beyond the previous SLR (Costa et al., 2024).

The results suggest a diverse set of themes within ApexBrasil's internationalisation role in the ecosystem, including technology, business strategy, governance, and foreign direct investment. The focus on institutional (APEXB BS IB) and operational barriers (APEXB BS OB) with 2,33% and 1,8% respectively, along with aspects like export culture and technology, indicates a comprehensive approach to international business development without ignoring the internal and external barriers in the Brazilian ecosystem. The Triple and Quadruple Helix dimension highlights the importance of collaboration between government, industry, academia, and society in ApexBrasil's strategy, with particular emphasis to its social role, which is clear in their focus on gender equality (APEXB BS Gen) – 1,08% and Environmental Social and Governance drive (APEXB THx ESG) with 1,62%.

ApexBrasil thematic analysis reveals an organisation that sees its institutional role as beyond the economic sphere of export promotion and foreign direct investment.

4.2.1 Content and Thematic Analysis – Code Interactions

As previously discussed, the thematic analysis was composed of 54 codes across 4 *a priori* and one *a posteriori* categories. Codes occurred in 554 instances during the interviews, with considerable intersections amongst the codes, totalling 898 (at least two codes occurring simultaneously).

Each Macro-Category presented a set of codes that had larger interactions with other codes across the interviews. Tables 4, 5, 6 and 7 display the major codes in each Macro-Category, including their occurrence in relation to all other codes (Occr), the percentage of interaction with other codes (Intxns with) and the relative percentage of interactions (Total Intxns), as well as for each main code, the codes with which there are more interactions, thus creating thematic clusters.

Table 4 highlights the interconnectivity of codes within all categories, indicating thematic areas of significance. (BE BS SA) is the most important code in all analysis, it represents over 11% of all occurrences, interacting with 57% of other codes, representing over 11% of all interactions. It is important to notice that the same code interacts significantly with codes from all *a priori* categories, specifically (EE EA LSE) - 13,46%; (PE DE e-cm) - 7,69%, (BE NS KT) - 7,69%; (BE FDI CBV) - 5,77%; and (IE THx UEC) - 5,77%. There is a profound correlation between Strategic alliances and local support ecosystems, pointing to the nurturing role played by ApexBrasil. Their influence on digital businesses is also seen in the interaction between strategic alliances and e-commerce and e-marketing categories.

Table 4

Business Ecosystems Codification Occurrence and Intersections

Codes	Occr	Intxns with	Total Intxns	Key Intxns	%
Strategic Alliances (BE BS SA)	11,73%	57%	11,58%	Local Support Ecosystems (EE EA LSE)	13,46%
				E-commerce and E-marketing (PE DE e-cm)	7,69%
				Knowledge Transfer (BE NS KT)	7,69%
				Cross-Border Venture Capital Investments (BE FDI CBV)	5,77%
				University - Industry Collaboration (IE THx UEC)	5,77%
Knowledge Transfer (BE NS KT)	7,04%	37,04%	6,90%	Local Support Ecosystems (EE EA LSE)	14,52%
				Digital Transformation (PE DTD DT)	14,52%
				Strategic Alliances (BE BS SA)	12,90%
				Cross-Border Venture Capital Investments (BE FDI CBV)	9,68%
				Startups and Scaleups (EE EO STSC)	6,45%
Cross-Border Venture Capital Investments (BE FDI CBV)	5,05%	38,89%	6,12%	Startups and Scaleups (EE EO STSC)	20,00%
				Knowledge Transfer (BE NS KT)	10,91%
				Strategic Alliances (BE BS SA)	10,91%
				Transnational Entrepreneurship (EE IE TE)	7,27%
Regional Clusters (BE CTs RCTs)	2,71%	25,93%	3,12%	Local Support Ecosystems (EE EA LSE)	21,43%
				Knowledge Transfer (BE NS KT)	17,86%
				Brazilian S System (APEXB THx SiS)	10,71%
				Institutional Barriers (APEXB BS IB)	10,71%
Dynamic Capabilities (BE BS DC)	3,61%	33,33%	3,01%	E-commerce and E-marketing (PE DE e-cm)	14,81%
				Resource-Based View (BE BS RBV)	11,11%
				Knowledge Transfer (BE NS KT)	7,41%
				Strategic Alliances (BE BS SA)	7,41%
				International Ambidexterity (BE BS IAB)	7,41%
				Knowledge-Based View (BE BS KBV)	7,41%
Supply Chain Management (BE NS SC)	2,71%	24,07%	3,01%	Local Support Ecosystems (EE EA LSE)	18,52%
				Strategic Alliances (BE BS SA)	14,81%

				Regional Clusters (BE CTs RCTs)	11,11%
Resource-Based View (BE BS RBV)	2,53%	18,52%	1,89%	Knowledge-Based View (BE BS KBV)	23,53%
				Dynamic Capabilities (BE BS DC)	17,65%
				Small and Medium Organizations (EE EO SMEs)	11,76%
				Knowledge Transfer (BE NS KT)	11,76%

Source: Elaborated by the authors based on Costa et al. (2024).

It is possible to perceive that local ecosystems support is profoundly related to business ecosystems strategy, focusing on networking, supply chain management and knowledge sharing within regional clusters, occurring mainly through strategic alliances.

Table 5 provides insights into the key thematic areas and interactions within the internationalisation ecosystem, emphasising the interconnectedness between entrepreneurial ecosystems, international entrepreneurship, and various dimensions of business networks and strategies.

Even though (EE EA LSE) occurs more often, (6,32%), it is the code with the least number of interactions (2,78%), only interacting with 22% of the codes. On the other hand, (EE EO STSC) occurs only 4,33% of the time, but has a much higher level of interactions, almost 39% of the codes, representing a little over 6% of all interactions. That leads to the inference that startups and scaleups are themes with broader scope, having several initiatives and programmes designated to support them.

Table 5

Entrepreneurial Ecosystems Codification Occurrence and Intersections

Codes	Occr	Intxns with	Total Intxns	Key Intxns	%
Local Support Ecosystems (EE EA LSE)	6,32%	22,22%	2,78%	Knowledge Transfer (BE NS KT)	20,00%
				Strategic Alliances (BE BS SA)	20,00%
				Startups and Scaleups (EE EO STSC)	12,00%
				Regional Clusters (BE CTs RCTs)	8,00%
				Cross-Border Venture Capital Investments (BE FDI CBV)	8,00%
				Enabling Technologies (PE DE Dtech)	8,00%
Startups and Scaleups (EE EO STSC)	4,33%	38,89%	6,12%	Cross-Border Venture Capital Investments (BE FDI CBV)	20,00%
				Business Incubators and Accelerators (EE AE BIAS)	9,09%
				Knowledge Transfer (BE NS KT)	7,27%
				Strategic Alliances (BE BS SA)	7,27%
				Born Globals (EE EO BG)	7,27%
Transnational Entrepreneurship	4,15%	27,78%	4,57%	E-commerce and E-marketing (PE DE e-cm)	19,51%

(EE IE TE)				Strategic Alliances (BE BS SA)	14,63%
				Cross-Border Venture Capital Investments (BE FDI CBV)	14,63%
				Startups and Scaleups (EE EO STSC)	12,20%
Small and Medium Organizations (EE EO SMEs)	2,53%	37,04%	3,45%	Strategic Alliances (BE BS SA)	12,90%
				Local Support Ecosystems (EE EA LSE)	12,90%
				E-commerce and E-marketing (PE DE e-cm)	6,45%
				Transnational Entrepreneurship (EE IE TE)	6,45%
				Resource-Based View (BE BS RBV)	6,45%
				Supply Chain Management (BE NS SC)	6,45%
				Export Culture (APEXB IE CExp)	6,45%

Source: Elaborated by the authors based on Costa et al. (2024).

Once again one of the key elements for their internationalisation is seen on the strategic alliances, specifically to develop local ecosystems to expand through e-commerce. It is possible to see ApexBrasil's role beyond the usual export promotion initiatives, providing different strategies for the international expansion of digital businesses and connecting different ecosystem players to create the synergy necessary to develop an internationalisation ecosystem.

Table 6 presents the least complex set of intersections. Within Innovation ecosystems only the code (IE THx UEC) had a significant occurrence (2,89%) as well as intersections with other codes (25,93%). The major intersection occurs with (BE BS SA), which is in accordance with the literature on Triple and Quadruple Helix, as the helix concept and *modus operandi* is related to strategic alliances and synergistic efforts (Leydesdorff, 2012; Etzkowitz & Leydesdorff, 2000).

Table 6

Innovation Ecosystems Codification Occurrence and Intersections

Codes	Occr	Intxns with	Total Intxns	Key Intxns	%
University - Industry Collaboration (IE THx UEC)	2,89%	25,93%	2,45%	Strategic Alliances (BE BS SA)	27,27%
				Innovation Networks (IE THx IN)	9,09%
				Open Innovation (IE IS OI)	9,09%
				Environmental Social and Governance (APEXB THx ESG)	9,09%

Source: Elaborated by the authors based on Costa et al. (2024).

It is important to emphasise that, this code has a considerable intersection with the *a posteriori* code (APEXB THx ESG), which plays a significant role in explaining ApexBrasil ESG orientation as an strategic alliance effort, placing ApexBrasil as a key integrating force amongst the helices; playing a role in innovation and social responsibility alike, whilst connecting different players to further integrate the ecosystem.

Table 7 presents the codes found within the Platform Ecosystem Macro-Category key interactions. Two codes have the largest number of occurrences, Digital Transformation (3,79%) and e-commerce e e-marketing (3,61%). Once again, strategic alliances play a fundamental role interacting with both codes 8,82% and 16,67% respectively. It is possible to notice that Knowledge transfer exerts considerable interaction with digital transition (23,53%), indicating the need to prepare the companies to digital transition in order to become more prone to internationalisation.

Table 7
Platform Ecosystems Codification Occurrence and Intersections

Codes	Occr	Intxns with	Total Intxns	Key Intxns	%
Digital Transformation (PE DTD DT)	3,79%	31,48%	3,79%	Knowledge Transfer (BE NS KT)	23,53%
				Digital Economy (PE DTD DE)	14,71%
				Strategic Alliances (BE BS SA)	8,82%
E-commerce and E-marketing (PE DE e-cm)	3,61%	33,33%	4,68%	Strategic Alliances (BE BS SA)	16,67%
				Transnational Entrepreneurship (EE IE TE)	14,29%
				Dynamic Capabilities (BE BS DC)	9,52%
				Cross-Border Venture Capital Investments (BE FDI CBV)	7,14%
				Startups and Scaleups (EE EO STSC)	7,14%

Source: Elaborated by the authors based on Costa et al. (2024).

Digital transition can be perceived as a mediating force for internationalisation, fostering it through a considerable amount of knowledge transfer as well as strategic alliances. It is also possible to see that ApexBrasil is quite advanced with regards to e-commerce, having integrated a platform strategy to support business exports and knowledge transfer.

4.2.2 Content and Thematic Analysis – Interview A.I. Analysis

Morgan (2023) highlights the efficiency, consistency, and objectivity of using ChatGPT for thematic analysis of interviews. The model processes large text volumes quickly and maintains a standardised, unbiased approach, enhancing reliability. However, challenges include a lack of contextual understanding and the necessity for human validation. While human coders offer depth and nuanced analysis, ChatGPT excels in data processing and uncovering hidden patterns, complementing human efforts. Combining automated analysis with human oversight ensures accuracy and contextual relevance (Hamilton et al., 2023). This practice aligns with qualitative research standards, emphasising the role of researchers in validating and interpreting data (Creswell & Creswell, 2018).

Therefore, the research also focused on the utilisation of ChatGPT4 to analyse the interviews in order to supplement the content and thematic approach previously applied (Guest, MacQueen & Namey; 2012; Bardin, 2011; Boyatzis, 1998). Table 8 displays the steps for the analysis and their respective prompts:

Table 8
ChatGPT Analysis - Procedures

Steps	Prompts
1. Each of the nine interviews was divided into smaller segments that could be properly analysed by ChatGPT 4.	Prompt 1: You are an artificial intelligence expert in thematic analysis (Boyatzis) and content analysis (Bardin). Highlight the main keywords in the texts below, focusing on the theme of internationalisation of Brazilian companies and the services provided by ApexBrasil.
2. Each segment was analysed according to prompt 1, forming keywords related to the theme of internationalisation and services provided by ApexBrasil.	Prompt 2: You are an artificial intelligence expert in thematic analysis (Boyatzis) and content analysis (Bardin). In the highlighted words and terms below, create thematic categories corresponding to central ideas, forming specific groups. Organise and present these groups in order of relevance, from most relevant to least relevant.
3. Keywords were analysed, and common terms were created, thus generating thematic categories.	Prompt 3: You are an artificial intelligence expert in thematic analysis (Boyatzis) and content analysis (Bardin). The words and terms highlighted below represent categories created by you based on previously presented text; now, you will create key thematic categories that encompass these different categories, forming specific groups. Organise and present these groups in order of relevance, from most relevant to least relevant.

Source: Elaborated by the author

This structure helps to understand the sequential process involved in analysing the interview segments and forming thematic categories found in Table 9:

Table 9
ChatGPT Analysis – Thematic Categories

Interviewee 1	Interviewee 2	Interviewee 3	Interviewee 4
Relationships with Government & Institutions Exportation & Internationalisation Agriculture & Related Products Innovation & Technology Social Responsibility & Gender	Internationalisation & Exportation Training & Professional Development Market Analysis & Business Intelligence Priority Sectors & Institutional Partnerships Digitalization & Technology	Internationalisation & Investments Innovation Ecosystem & Startups Sustainable Growth & Decarbonization International Business & Exportation Business Development & Partnerships	Internationalisation & Exportation Business Training & Development Market Intelligence & Analysis Networking & Business Relations Events & Pandemic
Interviewee 5	**Interviewee 6**	**Interviewee 7**	**Interviewee 8**
Internationalisation & Global Expansion Startups & Innovation Business Training & Development Business Strategy Sustainability & ESG	Internationalisation & Digital Export Digital Transformation & E-commerce Regional Development & Sustainability Partnerships & Commercial Promotion Internationalisation & Investment	Exportation & Internationalisation Qualification & Business Training Commercial Promotion & Institutional Partnerships Business Diversity & Entrepreneurship Economic Sectors & Sustainable Development	Export Strategy & Performance Internationalisation & Global Presence E-commerce & Service Sector Partnerships & Institutional Cooperation Qualification & Sustainability
Interviewee 9	**Supra-Categories**		
Export Planning & Preparation Strategy & Competence Investment & Partnerships Sustainability & Digitalization	1. Internationalisation & Export 2. Training & Development 3. Innovation & Technology 4. Market Analysis & Intelligence 5. Sustainability & Social Responsibility 6. Commercial Promotion & Strategic Partnerships		

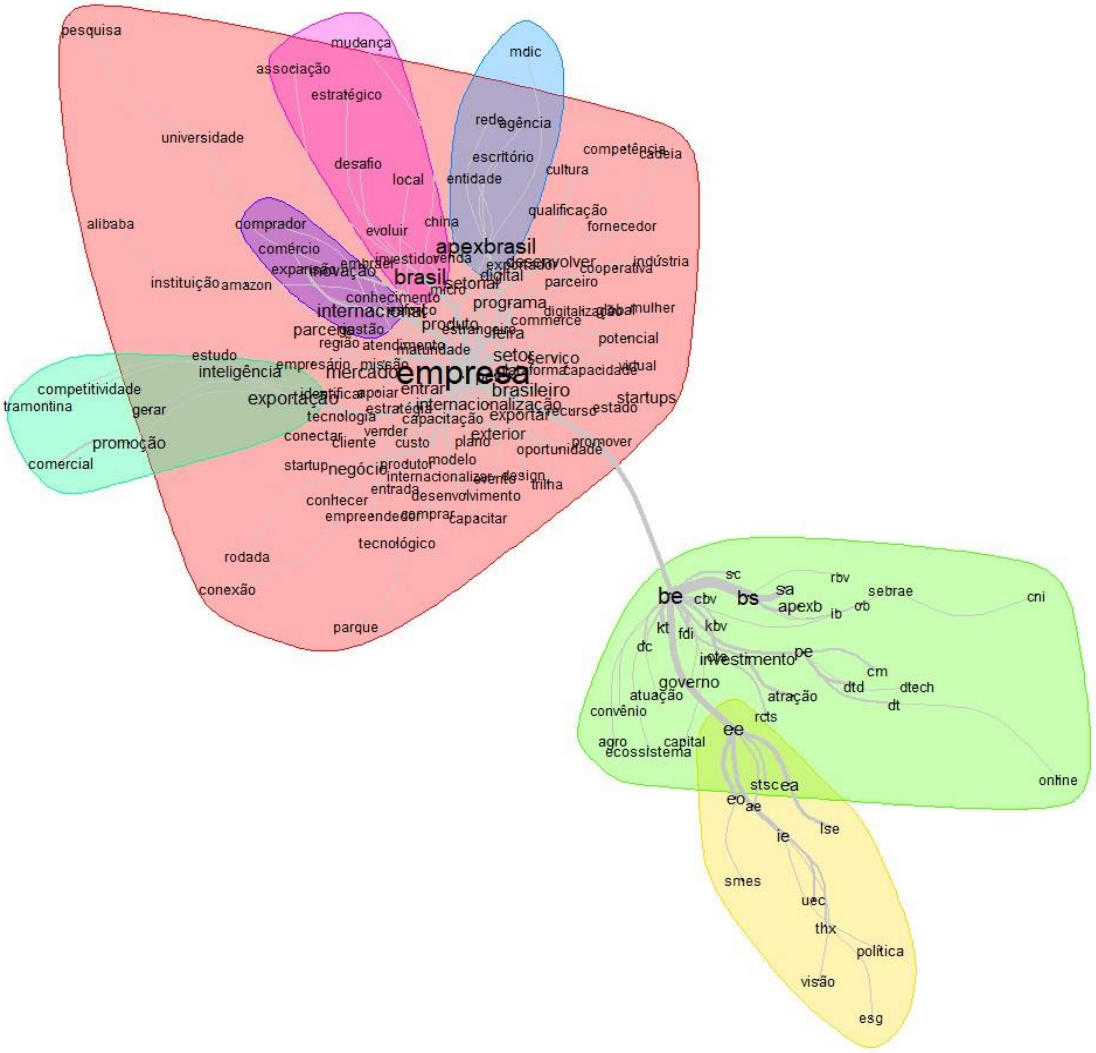
Global Connection & Export Culture	

Despite the diverse professional backgrounds and expertise of the interviewees, a substantial consensus emerged regarding their perceptions of ApexBrasil and its role within the Brazilian internationalisation ecosystem. The overarching theme, Internationalisation and Export, surfaced as the primary focus across all discussions. Given ChatGPT's reported challenges with contextualising data (Hamilton et al., 2023), the prominence of this topic aligns intuitively. It is important to highlight that subsequent overarching themes demonstrate varying degrees of association with all categories identified in the content and thematic analyses, as depicted in Tables 4, 5, 6, and 7. At this analytical level, ChatGPT's contribution appears to have validated the authors' category analysis, serving as a valuable tool without introducing any novel nuances.

4.2.3 Content and Thematic Analysis – Similarity Tree

The data was further analysed utilising Iramuteq to establish a relationship of co-occurrence amongst clusters of statistically significant words, as shown in Figure 3:

Figure 3
Similarity Tree



When analysing the meaning of the major words appearing in the positions, it is possible to see the relationship between four variables: competitiveness, innovation, technology, and export. The figure shows that there is a positive relationship between all four variables. This means that as competitiveness increases, innovation and technology also increase, and this leads to an increase in exports, which corroborates with previous analysis (Costa et al., 2024).

Figure 3 also shows that technology may have a mediating effect on the relationship between competitiveness and exports. This means that technology plays an important role in translating competitiveness into export success.

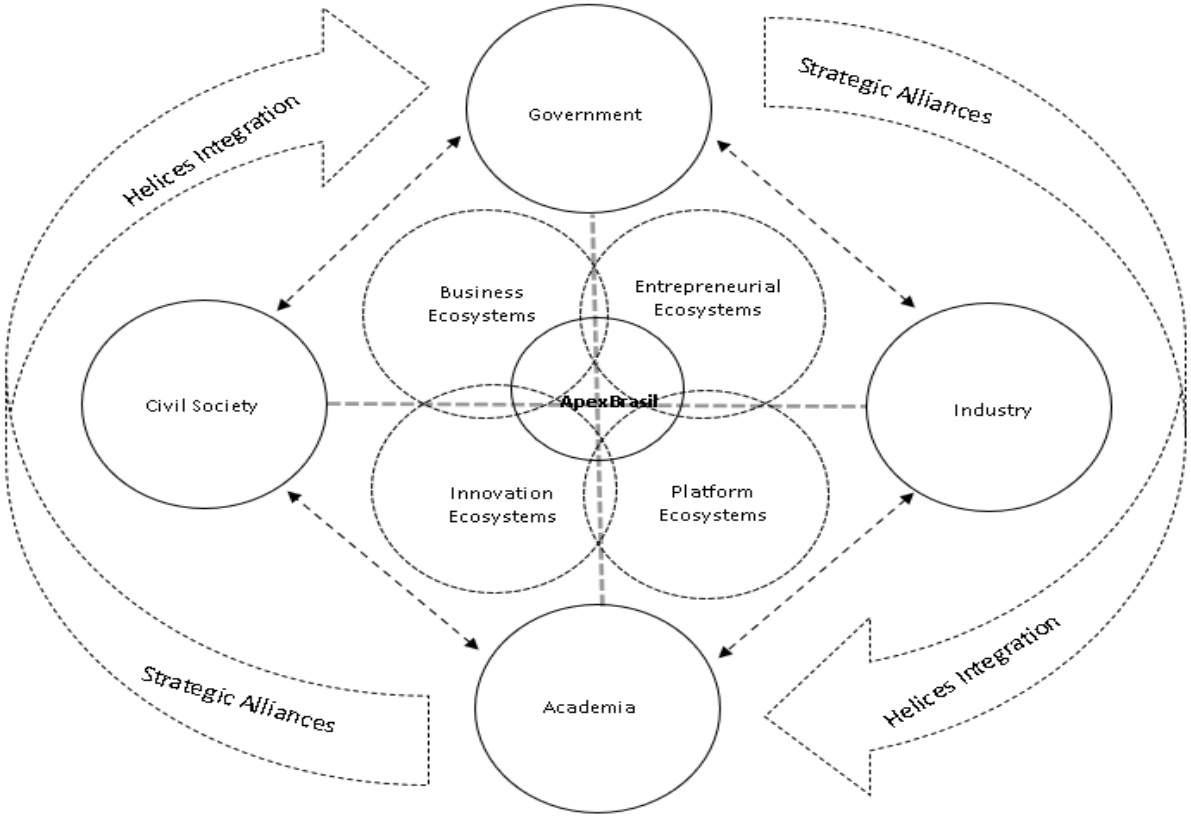
It is possible to perceive associations that are very close to Table 10, showing co-occurrence of key words related to the categories Training & Development; Innovation & Technology; Market Analysis & Intelligence; Sustainability & Social Responsibility; and Commercial Promotion & Strategic Partnerships.

It seems that the combination of Iramuteq and ChatGPT4 analysing the data has validated the previous *a priori* and *a posteriori* categories found in the literature and in the content and thematic analysis carried out in the interviews.

4.2.4 A Grounded view on ApexBrasil's Institutional role in the Brazilian internationalisation ecosystem

Upon examining the data presented, a discernible institutional role emerges for ApexBrasil – one that lacks clear identification in pertinent business literature regarding the institution (Costa et al., 2022) or other similar organisations across the word. Figure 4 presents the grounded theorisation about ApexBrasil's potential role in the internationalisation ecosystem:

Figure 9:
ApexBrasil Internationalisation Role – A Grounded View



Source: Elaborated by the author.

Notably, this role appears distinct from existing grounded theories on business ecosystems. Positioned within the System S framework (Costa et al., 2022), ApexBrasil assumes a unique role, functioning not only as an executor of public policy but also as a potential pivotal axis within the triple and quadruple helix structure. It is contended that the crux of ApexBrasil's institutional role within the internationalisation ecosystem framework does not conform to a singular helix (government); rather, it functions interconnecting various helices (government, academia, civil society, and industry) whilst concurrently weaving a business ecosystem oriented toward internationalisation.

As a pivotal axis, ApexBrasil assumes many different institutional roles, not clearly described in its strategic report and managerial reports (ApexBrasil 2020a, 2020b). Firstly, it bears an institutional role of a collaborative facilitator, creating platforms and initiatives that bring together government, industry, academia, and civil society. It also establishes a collaborative culture, fostering open dialogue and mutual understanding amongst diverse stakeholders. Finally, despite not having its main focus on innovation, ApexBrasil strategically aligns the activities and initiatives of the different helices within the Quadruple Helix Model, identifying synergies and coordinating efforts to ensure a harmonious integration that maximises the impact of innovation across sectors).

The concept of institutional helix integration, previously unexamined in the triple and quadruple helix literature concerning single institutions, raises intriguing avenues for further research, as summarised in Table 11:

Table 11

ApexBrasil and Internationalisation Ecosystem – A Grounded Research Agenda

Research Theme	Key Research Questions
Adaptability of the Concept of Helix Integration	Can the concept of helix integration, as identified in the case of ApexBrasil, be applied to other institutions or contexts? How adaptable is this concept in explaining the collaborative dynamics within internationalisation frameworks in various settings?
Helix Integration Dynamics	How effective is ApexBrasil managing the integration of different helices (government, academia, civil society, and industry) in its internationalisation efforts? What are the key challenges and successes in fostering collaboration and coordination amongst these diverse stakeholders?
Comparison with Other Internationalisation Agencies	How does ApexBrasil's institutional role in internationalisation compare to similar agencies in other countries? Are there unique features in the roles played by internationalisation agencies worldwide?
Impact on Business Ecosystems	What is the actual impact of ApexBrasil's role on the business ecosystem, particularly in terms of internationalisation? How do businesses within the ApexBrasil ecosystem perceive and respond to the unique role played by the institution?
Long-Term Impact on Policy Execution	To what extent does ApexBrasil's role as an executor of public policy contribute to the successful internationalisation of businesses? Are there examples where the institutional role has led to significant policy outcomes, and what are the key success factors?
Stakeholder Perspectives and Involvement	How do different stakeholders (government, academia, civil society, industry) perceive their involvement with ApexBrasil in the internationalisation process? Are there variations in stakeholder perceptions and involvement based on sector or industry?

Source: Elaborated by the author.

The diversity of relevant and original research questions, seems to validate the study carried out by Costa et al. (2022) in which it was noted that ApexBrasil' role within the Brazilian business internationalisation scenario is little researched and has not caught the due attention it deserves.

5. Conclusion and Recommendations

The article conducted through content and thematic analysis using a grounded approach provides a nuanced and new understanding of ApexBrasil's institutional role in the Brazilian internationalisation ecosystem. The conceptual internationalisation ecosystem framework was presented as contemporary and dynamic business frameworks distinguished by their emphasis on open innovation, collaborative work practices, and technology-driven business models. These ecosystems fundamentally prioritise internationalisation as the central determinant shaping their nature. The transnational aspect of internationalisation assumes a pivotal role within the model, indicating a paradigmatic shift towards global collaboration and market engagement

The findings suggest that ApexBrasil plays a pivotal role in fostering strategic alliances and knowledge transfer, indicating a significant involvement in building collaborative partnerships to enhance Brazil's global presence. The research highlights ApexBrasil's substantial role in the entrepreneurial ecosystem, emphasising local support, global perspectives, educational initiatives, and the growth of startups. Digitalization emerges as a key theme, with a strong emphasis on digital transformation, adoption of digital technologies, and strategic integration of digital platforms for marketing and innovative business models.

The discernible institutional role that emerges for ApexBrasil challenges existing theories on business ecosystems and helices dynamics. Positioned within the System S framework, ApexBrasil assumes a unique role as both an executor of public policy and a representative within the triple and quadruple helix structure. Contrary to a singular helix, ApexBrasil functions as a pivotal axis, interconnecting various helices whilst concurrently weaving a business ecosystem oriented toward internationalisation. The nature of such a role is complex and dynamic, demanding further studies to delve into the pivotal axis concept and its applicability within ApexBrasil and other key institutions in the Brazilian internationalisation ecosystem.

Even though the work focused on ApexBrasil, it is possible to argue that the results, specifically the concept of Pivotal Axis within the Triple and Quadruple Helix Theory is an important contribution and other organisations may play similar roles, which demand further studies to delve deeper into the concept.

The research has some limitations common to its procedures and nature. It utilised a small sample size of nine individuals, potentially limiting the representation of diverse perspectives within the ecosystem. Including stakeholders from various institutions would enhance understanding. Additionally, temporal constraints may affect the relevance of findings, urging consideration of ApexBrasil's evolving role over time. The subjective nature of content and thematic analysis introduces potential researcher biases. Lastly, while the study mentions ApexBrasil's role in connecting helices, it lacks a detailed exploration of the dynamics and challenges involved, suggesting a need for deeper investigation in future research.

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