



08, 09, 10 e 11 de novembro de 2022  
ISSN 2177-3866

## **INTERNATIONAL EXPANSION STRATEGY IN FAST-GROWING BUSINESSES: Using Bayesian Networks to identify influencing factors**

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Agradecimento à órgão de fomento:

This study was financed in part by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior - Brasil (CAPES) - Finance Code 001

# **INTERNATIONAL EXPANSION STRATEGY IN FAST-GROWING BUSINESSES: Using Bayesian Networks to identify influencing factors**

## **INTRODUCTION**

Fast-growing businesses are drivers of economic growth and job creation in both developed and emerging countries. This fast-growing organizational approach has garnered supporters from the 2008 global financial crisis to the present day (Lee, 2017). Based on the increasing relevance of fast-growing companies for the economy, researchers are showing increasing interest in understating this type of business, whilst Countries lead several initiatives to further support them (Yin, Moon and Lee, 2019; Thomas; Passaro and Quinto, 2020; Daunfeldt and Halvarsson, 2015).

The search for accelerated growth in these businesses demands diligence in technological capabilities. However, such capabilities alone are not a guarantee for success (Huang; Henfridsson; Liu and Newell, 2017). In addition to technological capabilities, a set of factors unique to each organizational management model are essential (Thomas; Passaro and Quinto, 2020). Understanding the success factors of fast-growing organizations that adopt an expansion model through internationalization can contribute to the development of a dynamic and competitive business ecosystem (Yin, Moon and Lee, 2019).

Given the amount and complexity of information available about these businesses, the Bayesian Network (BN) model may help decision-making based on a probabilistic analysis capable of addressing the uncertainties arising from convoluted business environments (Silva et al., 2021a).

Whilst statistical inferences combine scientific methods that can contribute to decision making based on estimates, adjusting unobservable probabilities about specific phenomena; Bayesian theory, on the other hand, seeks to maximize statistical inferences, by giving these probabilities a degree of subjectivity, as it is based on the option of specialists or external sources. This is the main distinction between Bayesian models and the so-called classical theory (Carvalho and Chiann, 2013). BNs simulate a graphic model capable of efficiently compiling the grouping of joint probabilities for several variables, constituted according to previous information (Heckerman, 2008). Also, researchers focused on studies in Artificial Intelligence (AI) have used BNs to compile specialized knowledge (Heckerman et al., 1995).

A transparent and flexible structuring model is required in order to associate factors of interest and offer satisfactory results that can corroborate with the decision-making process. BNs have been satisfactorily responding to such demands (Stritih et al., 2020). Although they employ mathematical probabilities, BNs are able to present unique illustrative results of the analysed network, enabling understanding by individuals who are not familiar with equations, providing interactive debates about their analyses (Dettileux, 2020). Besides offering low cost and moderate complexity, with satisfactory applicability in some cases, another advantage of BNs is that they comprise the understanding of changes in the environment during the execution of a given event, simulating the uncertainty and influence exerted by causality along the existing interrelationships (Shi et al., 2020). By operating together with the uncertainties of the environment, the BNs present themselves as a viable tool for the use of probabilistic graphic models (Boutkhamouine, Roux, and Pérés, 2020), being also suitable for inferences in an unknown environment from previous observable information (Almond, 2010).

## **RESEARCH PROBLEM AND OBJECTIVE**

The current research question reflects the pursuit of a probabilistic model, which may offer support in the identification of influencing factors that may affect international expansion

within fast-growing digital businesses. Thus, the authors sought to answer the following question: “Amongst the key factors that influence international expansion in fast-growing digital businesses, will there be significant differences per region or these factors maintain a similar degree of relevance?”

Hence, the current work seeks to identify, through the use of a Bayesian Network Model, the factors that influence changes in the international expansion strategy choices of fast-growing businesses in the following cities: Amsterdam, Berlin, London, New York and Paris.

## **THEORETICAL BACKGROUND**

Nowadays, fast-growing businesses stimulate innovation in different regions all over the world, as they use emerging technologies capable of developing new business models and, consequently, new products (Kohler, 2016). Fast-growing organizations emerged, with greater impetus, from the year 1994 onwards, when a large number of Internet-based technology corporations showed rapid growth, considerably superior to previous scenarios (Hellmann and Puri, 2002). After the global financial meltdown in 2008, developed countries such as Germany, Japan, the United States and England, as well as emerging countries, such as China, for instance, have actively embraced policies that encourage fast-growing organizations as a way to collaborate with economic restructuring and job creation (Lee and Kim, 2019).

It is important to note that on referring to fast growing businesses, the current authors adopt the definition previously established by the OECD-Eurostat Manual on Business Demography Statistics, which focus on accelerated cycle of growth with a minimal margin of 20%, in the past three years on headcount or revenue, through a scalable and repeatable business model (Costa et al. 2021).

Fast-growing business, as a rule of thumb, present an innovative disposition within their remit, followed by extensive investments in research and development of products and/or services, which leads to higher performance when compared to competitors (Yim, 2008). A research in Singapore investigated the similarity between partnership development and the performance of fast-growing organizations, it was observed that a greater volume of partnerships collaborates with obtaining a better performance, due to the access to new skills previously unavailable in the organization, created by a broader partnership portfolio (Pangarkar and Wu, 2012).

Previous research usually emphasized the relevance of innovation and entrepreneurship, but did not spell out how fast-growing businesses could effectively exploit and capture new opportunities. The introduction of new business concepts, exploiting potential new markets and presenting new technologies does not always equate to market success unless expressive values are presented to the target market (Thomas, Passaro and Quinto, 2020; Steininger, 2019). Competitive managers should seek out and engage those sectors of the business that present moderate investment risks but higher returns. Factors such as the manager's social competence can leverage the organization's limited resources, improving performance (Moon and Yin, 2020; Weinzimmer, 2000; Shah; Nazir and Zaman, 2013).

Mon and Yin (2020) argue that the importance of partnerships in enhancing performance or mitigating risks for fast-growing business has been explored by previous research; however, the studies did not particularly analyse other integration factors, neither the access of these organizations to other markets. Another critical obstacle to previous research on fast-growing businesses is that they looked at the competitiveness of fast-growing organizations only at the local level. Thus, the available body of knowledge provides only part of the understanding, not looking at how fast-growing organizations act when they expand internationally.

Although internationalization is an uncertain and complex procedure that presents significant challenges for any organization, several enterprises internationalize at the beginning of their activities (Costa et al. 2019; Loustarinen, and Gabrielsson, 2006). The early internationalization may provide an opportunity for rapid growth, developing the organization both in the domestic and foreign markets (Woo, 2020; Fernhaber and Li, 2010; Autio, Sapienza, and Almeida, J. G. 2000). Partnerships and international activities in new and young businesses positively affect actions related to prices, improve distribution and, consequently, market actions (Blesa et al., 2008), also improving domestic operational performance (Woo, 2020). There is also a positive relationship between technological practice and international expansion in new and young businesses (Zahra et al., 2000). On the other hand, a delay in internationalization may lead to the increase of entry barriers by foreign competitors (Paik and Woo, 2017).

External investors and venture capital play a pivotal role with business internationalization, taking part in their strategic decisions and also bringing awareness about potential growth opportunities in international markets (Woo, 2020), thus, companies with foreign corporate venture capital have a higher level of international participation and increased profitability at least at the early stage around the IPO (Woo, 2020; Park and LiPuma, 2020) and have also a higher likelihood of successful exits via IPOs and acquisitions (Dai; Jo and Kasscieh, 2012).

Exits and acquisitions are a viable option for organizations seeking accelerated growth, as private equity firms tend to plan for rapid and successful exits either via trade sales, IPO or secondary buy-out (Woo, 2020; Park and LiPuma, 2020, Dai; Jo and Kasscieh, 2012). It is important to note that, in the context of start-ups and scale-ups, exits carry no connotation of failure, quite the opposite (Wennberg and DeTienne, 2014); exits are the ultimate step of the entrepreneurial and start-up process, being characterized by a change of control as well as a liquidity boost for founders and early investors, which represents the possibility of massive earnings, fast growth, successful IPOs and fruitful mergers and acquisitions (Pisoni and Onetti, 2018; DeTienne, 2010).

Exits, when studied in the context of fast-growing businesses, are focused mainly on two financial harvest strategies: the IPO and mergers and acquisitions. It is also fundamental to realise that exit intentions – the initial strategic predispositions from founders – can influence future decisions and behaviours, companies that were thought out for quick exits backed by a dynamic growth orientation may not be able to scale beyond a certain point that will most likely demand an IPO or merger and acquisitions (Wennberg and DeTienne, 2014).

Therefore, it is vital for investors to distinguish between venture capital backed start-ups, which are companies derived for a successful exit since inception from lifestyle companies, which have a business model oriented for continuity (Pisoni and Onetti, 2018; Ries, 2011). However, it can be argued that exits should be planned since inception even if only as an alternative strategy (Ma, Lu and Xie, 2014).

At the early growth spurs, many companies will go through the process of building and manage an effective board. The lack of experience in management is quite often the key reason for failures in new ventures, and entrepreneurs must overcome such pitfall by attracting the best talent, thus increasing the company value (Satisteban and Mauricio, 2017). A well-developed board of directors may increase the learning curve of firms that are passing through their initial stage development, enriching human capital with information, expertise, experience and networking (Monteiro, 2019).

The networking, information and managerial knowledge provided by venture capitalists and private equity firms in the board development process are essential (Cavallo, Ghezzi, Dell-Era and Pellizzoni, 2019) as it is quite well known that rapid growth is usually not matched by

good and profitable management, given that the recruitment and selection processes cannot be successfully scaled (Kainde and Bateman, 2019).

The performance of a management board for businesses endeavouring rapid growth is also considered an important factor for the organization's international expansion, being an essential part of its managerial capital by creation and mobility of knowledge and skills through human capital, development towards a fast growth orientation as well as attraction and retention of talent (Costa et al. 2021; Boon, Eckardt, Lepak and Boselie, 2018; Quinton, 2016; and Rasmussen et al. 2011).

Businesses also expand beyond their borders through mergers and acquisitions (Pisoni and Onetti, 2018; DeTienne, 2010). Such strategy is seen as a relevant option for managers who seek accelerated growth, also presenting itself as an important instrument for diversification and innovation, collaborating with international expansion (Dai; Jo and Kasscieh, 2012). Mergers and acquisitions are also widely used by established organizations, in order to outline their expansion, quickly reaching a greater extent to offer products, customer portfolio and obtain further resources (Woo, 2020). Merger and acquisitions are also seen as an important exit route for digital businesses owners and investors, being an important tool for new technology acquisition and/or diversification as well as international expansion, especially when there are joint investments by foreign and venture capitalists (Dai; Jo and Kasscieh, 2012).

Finally, another key point taken into consideration in the present research is the importance of balance between growth and profit for fast growing businesses, which is a key interest to business ventures, especially those that undergo a fast-growth process through investments and are now located on Funding Series B, C and beyond, for not always such growth results in sustainable performance, especially on very young firms even on IPO events (Rosebusch, Brinckmann and Müller, 2013). International Expansion is seen as a key element on growth vs. profit balance (Paik and Woo, 2017).

It is relevant to notice that the growth stage in which the company is presented will define the type of funding and investors they are most likely to attract as it is closely interlinked with the risks they have to face as well as their level of expertise and market expansion (Kirwan et al, 2019; Cremades, 2016; Rosenbusch, Brinckmann and Müller, 2013). In table 1 we make that distinction clear, including the focus of the current research, aiming at companies in a position in which balancing growth vs. profit becomes more imperative.

**Table 1**  
*Investment series and firm growth stage*

<b>Type of Funding</b>	<b>Growth Stage</b>	<b>Type of Investor</b>	<b>Relevant for the research</b>
<b>Pre-seed</b>	Defining business model and operations – basically a potentially good idea without a business form or monetization plan.	Usually the company founders themselves.	No
<b>Seed</b>	The first official equity funding stage. The capital injection aims to expand the company into a scalable and repeatable business.	Founders, immediate founders' acquaintances, business incubators and accelerators, angel investors and venture capital companies.	No
<b>Series A</b>	The business aims to expand its established user base and optimize product offerings. Scalability may imply in cross border growth. The entrepreneur engages in resource-structuring behaviours.	Larger angel investors and more traditional venture capital firms as well as equity crowdfunding.	No
<b>Series B</b>	They are past the development stage and are ready to expand market reach on a larger scale.	Venture capital firms specialized in later-stage	Yes

	That is the stage of rapid headcount growth, with the integration of a professional team.	investments, private equity funds, investment banks.	
<b>Series C and beyond</b>	Successful fast-growing companies. Their challenge is to maintain growth, rather than achieve it. They are into marketing expansion and product development, but also consider acquiring new companies or undergo an IPO in order to expand rapidly and secure their leading position.	Hedge funds, investment banks, private equity firms, venture capital firms (to a lesser extent).	Yes

*Nota.* Adapted from Cremades (2016), Costa et al. (2021).

Given their complexity and interdependence, in order to adequately identify the factors that can influence changes in international expansion strategy choices of fast-growing businesses, it may be necessary to use a tool capable of helping in the identification of the factors that present a greater or lesser force, according to the universe studied. The elaboration and execution of a Bayesian Network (BN) implemented with the available information about fast-growing organizations may help to address the current research objective (Silva et al., 2021a).

To understand the Bayesian Networks *modus operandi*, it is necessary to analyse the concepts about the Bayesian theorem *vis-à-vis* the perspective of the classical probability. The Bayesian probability corresponds to a certain event  $x$ , based on given degree of belief about this event. Considering that a classical probability is a physical occurrence (e.g., the chance that a coin will land tails), the Bayesian probability is a property of a given prior source that confers this probability (e.g., this prior source's belief base on the odds of the coin landing tails). Thus, the classical probability of a given event is assigned as the physical or true probability of that event, and a certain degree of belief in an event is assigned as a Bayesian probability that can be based on a specific source or individual. Essentially, when the definition is open, a Bayesian probability is given merely as a probability (Heckerman et al., 1995).

A key distinction between Bayesian probability and physical probability is that, in order to measure Bayesian probability, repeated experiments are not needed. For instance, the repeated tossing of a sugar cube onto a soggy platform; whenever the cube is thrown, its volume will rapidly change. Therefore, although classical probability has difficulty in measuring the probability of the cube resting on a given face, the Bayesian probability will purely reduce the action to the next throw, attributing a new probability to it (Heckerman, 2008).

The mathematical pattern utilised in BNs is based on the Bayes probability theorem or Bayesian theorem, based on a prior understanding of a certain hypothesis  $H$ , updating its results according to the detection of some evidence  $E$  (Liu et al., 2021). Equation 1 (Eq1), highlighted in Wipulanusat et al. (2020), exhibits the probabilistic constitution of Bayes' theorem.

$$P\left(\frac{H}{E}\right) = \frac{P\left(\frac{E}{H}\right) P(H)}{P(E)} \quad (\text{Eq1})$$

$P\left(\frac{H}{E}\right)$  will admit the future probability, which is the probability that the hypothesis  $H$  continues in a certain state, after the eventual impact of the evidence  $E$ . Therefore, the probability  $P\left(\frac{H}{E}\right)$  will be deliberated as the conditional probability, which according to the hypothesis to be ascertained will constitute the evidence probability.  $P(H)$  will constitute the antecedent probability of the hypothesis, which will constitute the probability of the event of hypothesis  $H$  prior to the discovery of probable evidence  $E$ .  $P(E)$  is an autonomous probability, being accepted as a probable scale of the method. Based on the use of Bayes' theorem, the BNs

are constituted through an interface with several variables  $N_1, N_2, \dots, N_n$ , forming the network nodes.

The network of nodes, called “parent nodes”, with direct linkage to  $N_i$  will be conceived by  $\pi_i$  ( $\pi$ ). Thus, the conditional probabilities arrangement could be designed by  $P(N_i|\pi_i)$  (Wipulanusat et al., 2020). Equation 2 (Eq2) is displayed next:

$$P(N_1, N_2, \dots, N_n) = \prod_{i=1}^N P(N_i|\pi_i) \quad (\text{Eq2})$$

The sensitivity analysis is another relevant element pertaining to BNs, it refers to the diagnostic deduction procedure of how the uncertainty of the output node can be connected to the various sources of uncertainty of the input nodes (Zheng et al., 2020). It allows the identification of input nodes that are likely to exhibit the uncertainties along with the output node estimates. Thus, the sensitivity analysis is a relevant tool within the decision-making process, given that from the assessments it will be possible to identify the critical input nodes (variables), and how the variations in these nodes probabilistically interfere in the consequences of the node (variable) output (Shi et al., 2020; Wipulanusat et al., 2020),.

For sensitivity analysis,  $S$  is defined as the output node and  $E$ , the input node. The degree of sensitivity of  $S$  to  $E$  is denoted by the decrease in variance ( $V_r$ ). Equation 3 (Eq3) displays the expected decrease in output node variance, coming from the input node value (Wipulanusat et al., 2020).

$$V_r = V(S) - V\left(\frac{S}{E}\right) \quad (\text{Eq3})$$

$V\left(\frac{S}{E}\right)$  is the variance of the output node according to the input node  $E$ , and  $V(S)$  is the variance of the output node  $S$ . The input node with the greatest reduction in variance will probably constitute the node that will modify the output node’s beliefs, thus resulting in the explanatory ability on the output node (variable) (Wipulanusat et al., 2020). A high variance reduction in the input node will imply that the output node exhibits a high sensitivity to changes near the input node (Boutkhamouine, Roux, and Pérès, 2020).

Based on the theoretical concepts observed, it is possible to develop a method capable of helping to identify the factors that influence changes in the choices of the international expansion strategy in a short period of time, taking into account the localization of the evaluated business and the preferences and priorities of their CEOs and founders.

## METHODOLOGY

The study is descriptive and exploratory, as it seeks to describe a perceived phenomenon measuring certain characteristics inherent to the research theme, whilst proposing a different approach for its comprehension, thus exploring new methodological possibilities (Saunders, Lewis and Thornhill, 2016, Hair, 2005).

The premisses, derived from the theory, drive the process, and accommodate the arrangement of what needs to be measured, which, in the study, will involve the factors that influence changes in the international expansion strategy choices of fast-growing businesses. The exploratory vein of the research is based on the procedures, notions and/or conjectures utilised in the research, which proposes an original analytical approach - Bayesian Networks - employed in a real situation, seeking to contribute to the current body of knowledge about the theme (Hair et al., 2005).

The research was divided into two stages. Firstly, a qualitative longitudinal research with the CEOs and Founders of fast-growing digital businesses located or with significant

operation in Amsterdam, Berlin, London, New York and Paris between the years of 2016 and 2020 was carried out.

The sample chosen for the study was collected by convenience, from companies that attended networking businesses meetings in those respective cities designed to bring fast growing business closer to other key ecosystem stakeholders, such as investment banks, angel investors, private equity firms and consultants. The sample size and its longitudinal section can be seen in Table 2:

**Table 2**  
*Research Universe and Sample*

<b>Amsterdam</b>	Year	2016	2017	2018	2019	2020	Total
	Number of companies	96	91	77	0	0	264
<b>Berlin</b>	Year	2016	2017	2018	2019	2020	Total
	Number of companies	0	135	113	101	97	446
<b>London</b>	Year	2016	2017	2018	2019	2020	Total
	Number of companies	146	153	120	119	0	538
<b>New York</b>	Year	2016	2017	2018	2019	2020	Total
	Number of companies	0	0	72	77	0	149
<b>Paris</b>	Year	2016	2017	2018	2019	2020	Total
	Number of companies	0	0	94	87	0	181
<b>All cities</b>	Year	2016	2017	2018	2019	2020	Total
	Number of companies	242	379	478	384	97	1578

As previously presented by Costa et al. (2021), the companies analysed had to meet a series of criteria such as: i) be within funding series B, C and beyond; ii) have its headquarters or main operation in the cities studied; iii) be digitally enabled businesses only; iv) present at least 20% growth rate per three consecutive years; v) only CEOs and founders (individuals with primary equity share or high stake at the business) to attend the meeting and answer the survey.

The data analysed focused on the companies' strategic growth options and priorities for international expansion according to their CEOs/Founders, presenting the following options (The respondents could choose more than one option): i) How do you maximise personal return in an exit; ii) Pre-IPO planning; iii) Exits and Acquisitions; iv) Other options to venture capital: debt, venture debt & private equity; v) Building and managing an effective board; vi) Growth through acquisitions; and vii) Balancing growth vs profit.

Given that all companies met the criteria presented by Costa et al. (2021), the authors are led to believe that they represent non-biased sample that can describe with a valuable degree of accuracy significant traits of the universe analysed (Saunders, Lewis and Thornhill, 2016, Hair, 2005).

The Bayesian Network framework exhibits a qualitative approach and a quantitative approach (Efe et al., 2018). The qualitative approach, experienced as structural learning, is conceived from the modelling of the network, presenting the observable interdependence with the variables researched, that is, how the choices of the international expansion strategy relate to the influencing factors, simulated from a framework of acyclic directed graphs. Therefore, the quantitative approach, experienced as learning parameters, is a result of the connective links observed in the joint dependencies experienced in the probabilistic distributions of the researched variables. The quantitative approach is based on cause and effect relationships, derived from the first parameters (Lee et al., 2009). The first parameters were acquired from a treatment performed in the database.



The initial treatment with the database was performed in Microsoft Excel 365 software. The data was collected via Google Forms from all the companies that attended the business meetings specified in Table 2. In order to standardize the data in a probabilistic structure, which is the standard utilised in the BNs, the variable “International Expansion” was first grouped (considered the key factor of the research), by location – Amsterdam, Berlin, London, New York and Paris. Subsequently, the factors of interest were grouped by: How do you maximise personal return in an exit; Pre-IPO planning; Exits and Acquisitions; Other options to venture capital: debt, venture debt & private equity; Building and managing an effective board; Growth through acquisitions; Balancing growth vs profit; and None of the options.

Equation 4 was utilised together with the above clusters, this was suggested in the study by Silva et al. (2021b), presenting a viable data standardization structure for BNs elaboration.

$$PG_{RB} = \frac{EG_{RB}}{TG_{RB}} \quad (\text{Eq4})$$

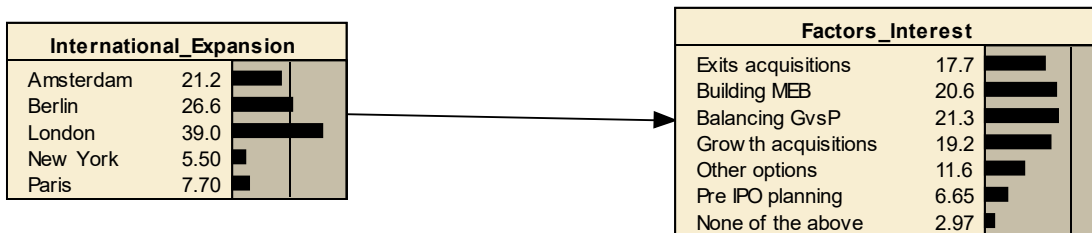
In equation 4,  $PG_{RB}$  simulates the desired standardization in the cluster (node) of the BN. The variable  $EG_{RB}$  refers to non-standard data (prior to treatment). The  $TG_{RB}$  variable represents the sum total of non-standardized data from the interest group. The purpose of the equation is to unify, in an adjusted way, the presence of a specific data within its interest group, so that the sum of all grouped data presents the total value 1 (Silva et al., 2021b). The Bayesian Network will employ a divergent connection structure, this one uses a notion of conditional interdependence, exposing a parent node “International Expansion” that acts directly on a child node “Factors of Interest” (Murray, 2016).

Norsys Software Corp's Netica was utilised for the modelling and execution of the Bayesian Network employed in the study. This is an application recommended for the development and modelling of Bayesian Networks, widely used in scientific works. The software presents a useful development environment, in which connections between nodes can be developed as singular probabilities (Norsys – Netica Application, 2022). After preparing the research development environment, it is possible to observe the analysis of the implications expected in the study, as well as any notes derived from these results

## RESULTS ANALYSIS AND DISCUSSIONS

After data treatment and standardization, the research advanced the BN modelling: The network structure provided a composition with two nodes, represented by the key factor “International Expansion” (parent node), and the child node represented by “Factors of Interest”. The nodes connected to the network from a single connection (link), generating in total 40 conditional probabilities. The developed BN can be seen in Figure 1.

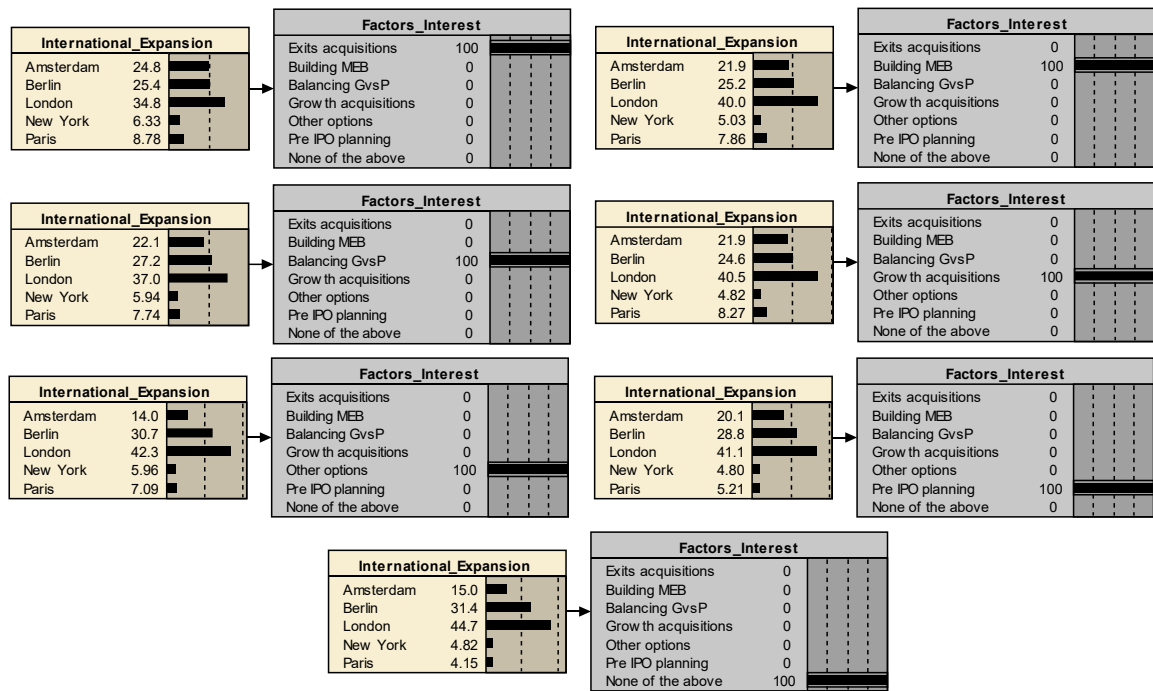
**Figure 1**  
*Bayesian Network International Expansion*



Given that it is a probabilistic tool, the BN standardizes the values for a scale that totals 100% at each node. The International Expansion node that presents the proportion of this

expansion according to the region presents the values 21.2, 26.6, 39.0, 5.50 and 7.70, totalling 100 or 100%. The node that displays the factors of interest has the values 17.7, 20.6, 21.3, 19.2, 11.6, 6.65, 2.97. Considering that the present research objective is to identify the factors that influence changes in the choices of the international expansion strategy of fast-growing organizations, according to the region evaluated, it was decided to evaluate the results from the triggers of the factors of interest within the network; thus, we seek to observe the behaviour of international expansion according to the location from seven triggers carried out in the network with the Factors of Interest. These can be seen in Figure 2.

**Figure 2**  
*Bayesian networks: factors of interest triggers*



Observing the simulation in Figure 2 which presents a 100% trigger in the Exits and Acquisitions parameter (Exits Acquisitions), comparing with the BN in its original state (Figure 1); it is possible to observe that there is a lower influence of the factor on the intention of international expansion in Berlin (26.6  $\rightarrow$  25.4) and London (39.0  $\rightarrow$  34.8). On the other hand, Amsterdam (21.2  $\rightarrow$  24.8), New York (5.50  $\rightarrow$  6.33) and Paris (7.70  $\rightarrow$  8.78) show greater interest in the Exits and Acquisitions factor.

Given that exists and acquisitions are a viable option for organizations seeking accelerated growth (Dai; Jo and Kasscieh, 2012), based on the literature analysed on exits and acquisitions (e.g. Pisoni and Onetti, 2018; Rigamonti et al., 2016; Wennberg and DeTienne, 2014; Ma, Lu and Xie, 2014; Li et al, 2013; Ries, 2011), it is possible to argue that in the context analysed, investors interested in a short-term liquidity boost based on quick exits, may deem the analysed companies in Amsterdam, New York and Paris as a more interesting investment. From an international expansion perspective, this seems to be the most distinctive strategy within the present study.

On analysing the simulation in Figure 2 which presents a 100% trigger in the parameter Building and managing an effective board (Building MEB), comparing with the BN in its original state (Figure 1); it is possible to notice a lower influence of the factor on international expansion in the cities of Berlin (26.6  $\rightarrow$  25.2) and to an extent in New York (5.50  $\rightarrow$  5.03).

The cities of London (39.0  $\rightarrow$  40.0), Paris (7.70  $\rightarrow$  7.86) and to a lesser extent in Amsterdam (21.2  $\rightarrow$  21.9) show greater emphasis on this factor.

Based on what has been presented in the literature about the topic (e. g. Kainde and Bateman, 2019; Cavallo, Ghezzi, Dell-Era and Pellizzoni, 2019; Monteiro, 2019; Boon, Eckardt, Lepak and Boselie, 2018; Satisteban and Mauricio, 2017; Quinton, 2016; Wallin, Still and Henttonen, 2016; Rasmussen et al. 2011; Davila; Foster and Gupta, 2003), it is necessary to access if the companies in Berlin and New York are already more mature in the development of their board, or if that is, in fact, a less pressing issue for those companies when considering international expansion. Companies with more mature boards may be on a more advanced stage in terms of human capital, which may be a key decisive factor to expand internationally and attract further investment.

With regards to the simulation in Figure 2 Balance growth x profit (Balancing GvsP), comparing with the BN in its original state (Figure 1); there is a smaller influence of the factor on international expansion in London (39.0  $\rightarrow$  37.0). Whereas in Amsterdam (21.2  $\rightarrow$  22.1), Berlin (26.6  $\rightarrow$  27.2), New York (5.50  $\rightarrow$  5.94) and to a lesser extent Paris (7.70  $\rightarrow$  7.74) the factor seems to have a greater weight.

From what was presented about growth vs. profit (Paik and Woo, 2017; Rosebusch, Brinckmann and Müller, 2013) The authors would point out to the need to enquiry if the lower impact of that factor on international growth in the London based companies may reflect a greater maturity of the market, or at least, of the sample analysed. Companies that have advanced on the balance between growth and profit, may be able to expand organically on an international level, having a more sustainable strategy.

The simulation on Figure 2 focusing in the Growth through acquisitions parameter (Growth acquisitions), when compared with the BN in its original state (Figure 1); presents a lesser influence of the factor on the international expansion decisions in Berlin (26.6  $\rightarrow$  24.6) and New York (5.50  $\rightarrow$  4.82). The cities of Amsterdam (21.2  $\rightarrow$  21.9), London (39.0  $\rightarrow$  40.5) and Paris (7.70  $\rightarrow$  8.27) show a greater relevance of the factor.

The results may indicate a greater access to financial resources or greater liquidity within those regions (Woo, 2020), which is essential to financial expansion and to attract capital at a lower cost.

The simulation in the parameter Other options to venture capital: debt, venture debt & private equity (Other options) in Figure 2, when compared to the BN in its original state (Figure 1), displays very little influence of the factor on the intention of international expansion in Amsterdam (21.2  $\rightarrow$  14.0) and to a lesser extent in Paris (7.70  $\rightarrow$  7.09). On the other hand, Berlin (26.6  $\rightarrow$  30.7), London (39.0  $\rightarrow$  42.3) and New York (5.50  $\rightarrow$  5.96) have stronger results regarding this factor.

The use of external capital is one of the ways that fast-growing organizations use to expand their activities beyond their borders (Paik and Woo, 2017), thus the results indicate that those companies may have very distinct internationalization strategies in those different regions, demanding from investors a customized approach to their portfolio.

Considering the simulation on the Pre-IPO planning parameter (Pre IPO planning) in Figure 2, compared with the BN (Figure 1); a reduced influence of the factor is observed on the international expansion of businesses in Amsterdam (21.2  $\rightarrow$  20.1), New York (5.50  $\rightarrow$  4.80) and Paris (7.70  $\rightarrow$  5.21). Conversely, the cities of Berlin (26.6  $\rightarrow$  28.8) and London (39.0  $\rightarrow$  41.1) show more robust results related to this factor.

Given the importance of IPOs for fast-growing organizations (Woo, 2020; Park and LiPuma, 2020; Dai; Jo and Kassicieh, 2012), it is possible to see again indicatives of more mature and competitive businesses in Berlin and London, which may attract different types of investment and offer different levels of risk. Those business will also have a more sustainable internationalization strategy, based on organic expansion.

In the last simulation in Figure 2, with the None of the above alternatives (None of the above), comparing with the BN original figures (Figure 1), it can be seen that in Amsterdam (21.2  $\rightarrow$  15.0), New York (5.50  $\rightarrow$  4.82) and Paris (7.70  $\rightarrow$  4.15) the factor has considerable less weight, compared to the cities of Berlin (26.6  $\rightarrow$  31.4) and London (39.0  $\rightarrow$  44.7).

It seems that Berlin and London, perhaps due to the likely superior degree of maturity of the companies, are seeking for other relevant options for their growth strategy.

## CONCLUSION

The current research sought to analyse which factors influence changes in the choices of the international expansion strategy of fast-growing organizations, according to the region in which they are based. Using a probabilistic model, it was possible to identify, through the Bayesian Networks method, the factors that most considerably influence changes in the choices of the international expansion strategy. The analysis developed, based on the observation of the simulations, made possible to identify the factors that influence the results according to their incidence.

Although the network uses probabilistic mathematical equations in its parameterization framework, it was possible to visually observe the model, both the model without the triggers and the illustrations with individual triggers in each factor, facilitating its understanding for those that are not familiar with mathematical equations. Regarding the observed findings, Exits and Acquisitions have a greater influence on CEOs and founders' decision for international expansion for businesses in Amsterdam, New York and Paris. Other Venture Capital Options: Debt, Venture Debt and Private Equity have a greater relevance in businesses in Berlin and London. Throughout the study, several factors point out that the companies analysed in London and Berlin present a more mature business model, which may have a great impact on investment and partnership attraction.

Conversely, when analysing factors with the lowest influence, the factor Other Venture Capital Options: Debt, Venture Debt and Private Equity exhibits a low influence on CEOs and founders' decision to internationalize their business in Amsterdam. The growth through acquisitions factor has a lower relevance in Berlin. The Exits and Acquisitions factor shows a lower influence in London businesses. The Pre-IPO Planning factor has low influence on businesses in New York and Paris. Another finding is that the businesses in Amsterdam and London display inversed results in relation to the factors that had the greatest and least influence. The factors that explain such differences could be explored in further studies, in order to identify if it is characteristic of the whole market or of the sample analysed.

With regards to the limitations of the study, the network modelling was based solely on the data collected on the networking business meetings organized in the different cities throughout the years 2016 to 2020. The sample, thus, was based on convenience and may have a degree of bias, compared to the universe of start-ups on those different regions, a different database with a greater longitudinal cut and more companies could yield different results. Another key limitation were the number of factors made available for the CEOs and founders to choose, other factors certainly have significant influences upon changes related to the choices of international expansion strategy; thus, the node that represented no option (none of the above) had such a great weight that may render the other results less relevant, as it seems that several key factors might have been left out. Finally, the data was only collected in pre-pandemic scenario, with no data in 2021 and 2022. It is feasible to infer that the pandemic may have disturbed the scenario presented in the current research.

However, the results bring light to the understanding of the differences between growth strategies and how location may influence such decision, which is particularly useful for investors, academics, as well as for market policy making. New studies based on other sources

of information, as well as with a scope capable of including a greater number of factors together with the simulations, could present new insights to further enlighten the current knowledge about fast-growing business and their international expansion strategies. Also, a comparative analysis about the scenarios before and after the pandemic may yield new insights on the maturity and robustness of those businesses. Finally, it would be interesting to implement another mathematical model in the same database, distinct from the Bayesian Networks, in order to compare results, allowing for more robust and conclusive insights.

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