


# Chapter 18

## Challenges of the Internationalization Strategy of a Technology-Based International New Venture

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### ABSTRACT

*The present study seeks to analyze the behavior of a technological start-up regarding its entry modes in foreign markets. It is based on the case study of a company in the field of 3D printing and takes into account the analysis of topics such as the internationalization of start-ups and modes of entry in foreign markets, considering several theories of internationalization. As the company analyzed is a start-up, the research is supported by the analysis of the characteristics present in the process of internationalization of small and medium-sized enterprises (SMEs). The study closes with the conclusion that this SME matches the profile of an International New Venture/Born Global (INV/BG), although the company takes advantage of the network-based theory and relationship orientation to enter international markets. The most used mode of entry by the company in international markets has been exporting activities.*

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## **INTRODUCTION**

Internationalization is very important for SMEs, especially for technology-based ones seeking new markets to exploit their competitive advantages (Stanisauskaite & Kock, 2016). Internationalization has been traditionally analyzed from an incremental perspective as SMEs tend to be gradually involved in international markets through a series of evolutionary stages (Bell, McNaughton, & Young, 2001; Ribau, Moreira, & Raposo, 2015).

In a new reality, marked by the globalization of markets and technological innovation, the emergence of internationalized, more agile and flexible companies, are based on behaviors that go beyond those analyzed in the traditional internationalization models. With the pervasive effect of the globalization process, the internationalization of start-ups has increased steadily and research has stressed the importance of the concept of INVs, as well as the need to understand the factors that influence the success of such companies (Oviatt & McDougall, 1994; Tanev, 2012). INVs represent a growing and important type of start-up. They are defined as business organizations that, from inception, seek to derive significant competitive advantage from the use of resources and the sale of outputs in multiple countries (Oviatt & McDougall, 1994; McDougall, Shane, & Oviatt, 1994).

Research conducted regarding rapid internationalization and INVs highlight the way companies start and grow by meeting customers' and international markets' needs (Oviatt & McDougall, 1999; Cavusgil & Knight, 2009). The literature provides clear evidence of rapid and dedicated internationalization of INVs and BGs (Bell et al., 2001), by adopting a global approach since their inception or up to their first three years (Danik & Kowalik, 2015). However, the literature on INVs is still scant (Ribau, Moreira, & Raposo, 2018a).

Based on the case study of a singular company in the field of 3D printing – for confidentiality reasons hereafter known as OMEGA – this chapter seeks to analyze the behavior of a technological start-up in what concerns to its process and mode of internationalization. It considers the theories of internationalization, as is the case of the traditional Uppsala model, network-based theory, relationship orientation and INVs, in order to understand the characteristics that define the type of company under study. Although this technology-based company, focused on 3D printing, has a strong technology orientation, it can be seen that the modes of entry in international markets have limited its external growth.

The analysis of this case study aims at exploring the behavior of this technology-based start-up, namely of the following typologies/theories: INVs/BGs; Uppsala model; network theory and relationship orientation, in what concerns its internationalization process. For that purpose, a qualitative methodology shall be applied, based on structured interviews as the method of primary data collection. The main contribution of this chapter stems from dealing with a real case situation of a technology-based firm that has internal competencies and seeks to internationalize its activities. As such, several internationalization theories are discussed on how properly they fit the internationalization process of the firm.

The rest of the chapter is structured as follows: the first section covers the literature review of the main types of firms that fall in the internationalization theories and modes of entry. The second section addresses recent topics on 3D printing. The third section presents the research method. The fourth section presents the case study. The fifth section discusses the findings. Section sixth presents the conclusions of the chapter.

## LITERATURE REVIEW

### Internationalization

The concept of internationalization has evolved over time (Ribau et al., 2015). It has been incorporating varied theoretical perspectives as well as several analytical influences. For example, Calof and Beamish (1995) define internationalization as the process of adapting business operations to the international business environment. There are several definitions that encompass different phenomena under study that involve spot and continuous export activities, cross-border collaboration, alliances, Greenfield investments, the establishment of subsidiaries, branches and joint ventures (Chetty & Campbell-Hunt, 2003), which are based on an outward perspective. Although the inward perspective is also important (Moreira, Ferreira, & Silva, 2018), this chapter deals only with the outward perspective.

Internationalization is seen as a key factor for growth and industrial competitiveness (UNCTAD, 2013). However, even if SMEs are becoming active players in global markets, outward internationalization is a risky process even for experienced large firms (Meyer & Gelbuda, 2006). If the internationalization process imposes several challenges to SMEs as a result of governmental, cultural and psychic differences among countries (Li & Guisinger 1991; Reardon, Erramilli, & Dsouza, 1996), SMEs need also to face the internal barriers, which are related to their business activities. According to Johanson and Vahlne (2009), the main challenges firms face during the internationalization process are the following ones: liability of outsidership, which is the lack of knowledge on the target market and its players, and the liability of foreignness, which is the psychic distance covering factors such as laws and language barriers. Although internationalization is understood as an uncertain activity in a broad, unknown and challenging contextual environment (Figueira-de-Lemos, Johanson & Vahlne, 2011), typical of a globalized economy, the decision not to internationalize is seen as a more risky decision (George, Wiklund, & Zahra, 2005) as firms that do not internationalize can lose competitiveness and rely excessively on a single and / or domestic market (Hilmersson, 2014).

Hilmersson (2014) understands internationalization as the set of activities of firms that seek to find and establish network positions in international markets in order to implement cross-border networked-based relationships (Johansson & Mattson, 1988). These networks play a key role in creating initial contacts, assessing experimental information, and increasing export capacity (Christensen, 2006).

### Uppsala Model

Several authors have studied internationalization as a process that involves evolutionary, sequential steps in which firms move from occasional exporting activities to international production activities over time (Johanson & Wiedersheim-Paul, 1975; Johanson & Vahlne, 1977; Ribau et al., 2015). This behavioral model of internationalization, known as the Uppsala model, explains the internationalization process through the process of learning companies deploy in the context of internationalization, as well as the impact of this learning on its international performance (Forsgren, 2002). According to this model, as firms internalize knowledge gained in unfamiliar foreign markets, they are willing to move on to more resource encompassing stages of the outward international path (Johanson & Vahlne 1977; 1990).

According to the Uppsala model, entering new foreign markets is a process based on phases of gradual construction of knowledge, and uncertainty and risk reduction based, on the choice of certain nearby / familiar markets ((Rahman, Uddin, & Lodorfos, 2014; Ribau et al., 2015).

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When they begin their internationalization process, firms are faced with different cultures and languages, opting to enter markets whose “psychic distance” is lower. For “psychic distance” is meant the set of factors that hinder the flow of information to and from a given market (Johanson & Vahlne, 1977). This distance refers to the set of social and economic aspects in a given market, such as language, education, culture, politics, business practices or differences related to industrial development (Rahman et al., 2014). Thus, culture presents one of the main barriers to internationalization, and this is one of the reasons why companies start their internationalization process in markets that have cultural similarities and that guarantee them a lower perception of risk and uncertainty (Rahman et al., 2014).

As market knowledge is considered tacit knowledge, the Uppsala model argues that the learning process should be carried out through active behavior with a greater focus on operations than in the collection and analysis of information (Forsgren, 2002). This type of approach, that involves a growing risk, enables companies not only to gather information but also to establish a close relationship with these foreign markets (Forsgren, 2002). In this way, companies that operate in certain markets, and develop activities that allow them to gather extensive knowledge and experience about them, will be better able to identify opportunities and threats (Johanson & Vahlne, 1977).

The Uppsala model presents a pattern of internationalization in which, on one hand, companies opt to invest in only one or few neighboring countries – instead of investing in several countries simultaneously – and, on the other hand, that these investments are carried out in a sequential and cautious way, based on the rationale that the acquisition of market knowledge leads to larger and subsequent investments, which, in turn, lead to the acquisition of more knowledge by reinforcing new investments in order to gradually reduce risk perception (Forsgren, 2002). In this way, companies opt to start establishing commercial relations with culturally closer countries, later on investing in markets with greater psychic distance (Johanson & Vahlne, 1990; Forsgren, 2002).

In general, the Uppsala model argues that the process of internationalization unfolds in an evolutionary way as a consequence of an increase in knowledge and commitment acquired through operations in foreign markets, and can be divided into four phases: exports; independent representatives (agents or distributors); establishment of a foreign sales subsidiary; and establishment of foreign production / manufacturing units (Ribau et al., 2015).

It should be noted that some studies criticize the Uppsala model for assuming a pattern of static behavior that is based on a slow internationalization process focused on steps that consider factors such as psychic distance and risk aversion in the choice of markets (Forsgren, 2002; Ribau et al., 2015). Based on this type of assumption, the model does not allow to predict different behaviors on the part of the companies, not explaining how and when the process of internationalization of companies begins, focusing only on the activities that take place after the initiation of this process (Oviatt & McDougall, 1999; Moen & Servais, 2002; Rhanman et al., 2014; Ribau et al., 2015).

### **Network-Based Theory**

The Uppsala Model assumes that firms learn and increase their knowledge about foreign markets over time, primarily based on the acquisition of experience in markets that share socioeconomic similarities, and then increase their market expansion, and only in a final stage, expanding its business to more distant markets and assuming high-commitment entry modes (Oviatt & McDougall, 2005; Johanson & Kao, 2010).

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Based on the changes of international markets, Johanson and Vahlne (2003) referred the importance of collecting information and knowledge (proposed on the initial model) by establishing networking relationships with customers and suppliers. This type of relationship of greater commitment may allow companies to identify business opportunities in foreign markets without the need to adopt the traditional incremental process (Johanson & Vahlne, 2003).

The network-based view of the firm (Håkansson, 1982; Håkansson & Johanson, 1984), based on a relational-based perspective among market players, has also been important in explaining how SMEs succeed in international markets.

This network-based perspective can be the result of an extension of the Uppsala model and seeks to analyze and understand industrial systems through three variables: (1) agents, as individuals, companies or groups; (2) activities; and (3) material, financial or intangible resources, such as knowledge (Ribau et al., 2015). In addition, the network-based internationalization model is based on three essential points: (1) the strength of the network links; (2) the network size; and (3) the overall network density (Oviatt & McDougall, 2005). Therefore, it is assumed that the development of closer and consolidated relations between companies and their stakeholders is carried out by investing in relationships based on high commitment and trust, i.e. those that follow a long-term perspective (Oviatt & McDougall, 2005).

Although network-based relationships extend to companies of various sizes, this type of approach is mainly focused on SMEs, since they have more limited resources, being dependent on other agents and, therefore, seek building relationships that allow them access to the resources they need, and internationalization is a way of ensuring the survival of these smaller companies (Johanson & Mattsson, 1988; Ribau et al., 2015).

This new networking model demonstrates that there is a close relationship between the internationalization of the firms and the relations it establishes with other international organizations (Johanson & Vahlne, 2009).

The intensive search for opportunities is a behavior that has emerged in the last decades. Companies with a sophisticated network of contacts are likely to look for opportunities in different ways from companies with limited experience that do not use the same network (Johanson & Bai, 2017).

One can argue that opportunities depend to a large extent on the type of network in which the company is embedded as well as on the intellectual capital of the company. Following the same line of thinking, several studies argue that the rapid international growth of a company can result from the level of networking relationships companies have, being this behavior more evident in the modes of entry in international markets of young and small companies whose resources are limited (Coviello & Munro, 1997). As such, strong international business relationships represent one of the most important characteristics to the success of global start-ups (Johanson & Kao, 2010).

In fact, when committing different stakeholders to networking relationships, companies can have access to cheaper resources, extended opportunities and specific knowledge, advantages that would not be available without the existence of a well-established network of contacts (Dubini & Aldrich, 1991; Witt, 2007).

In general, one can argue that the traditional perspective based on power and control between companies gave way to a strategy based on cooperative relationships that aim to access international business opportunities (Wright & Dana, 2003; Ribau et al., 2015).

It is clear that the existence of a well-established relational network can represent a strong competitive advantage in the process of internationalization of SMEs, supporting firms in the adoption of different behaviors from those initially proposed by the traditional Uppsala model – through the identification

of business opportunities, sometimes leading to cooperative strategies, as well as to access to resources that would not be available without this network (Johanson & Vahlne, 2003; Oviatt & McDougall, 2005; Lin & Chaney, 2007; Ribau et al., 2018a; 2018b).

## **Internationalization of Start-Ups**

SMEs increasingly internationalize their activities (Coviello & McAuley, 1999; Ruzzier et al., 2006), expanding their exports to several target markets (Christensen, 2006). SMEs are unlikely to escape international competition even if they serve only the domestic market. Moreover, the small changes and limitations of domestic markets force early exports, when market deterioration occurs (Christensen, 2006).

There are three major dimensions about internationalization that should be taken account (Christensen, 2006):

- Time, which corresponds to the period from the beginning of the firm's foundation to the beginning of the firm's export activity. It is imperative that SMEs reduce the time between the establishment of the company and the beginning of the export activity (reduction of timelag). This issue is central to internationalization as time is decisive for the construction of internal and external resources in order to respond to the market;
- Internal resources: they adjust the firm's capacity to find, include and use external resources in favor of exports;
- External resources: the need to commit resources to support the expansion of exports, i.e. the acquisition of relevant information, since firms do not have the time, resources or experience to support the formal process of information construction.

On the other hand, there are several obstacles to internationalization of SMEs, among which the following stand out (Johanson & Vahlne, 2009; Li & Guisinger, 1991; OECD, 2009; Meyer & Gelbuda, 2006; Reardon, Erramilli, & Dsouza, 1996; Schweizer, 2012):

- Lack of top management commitment, which in turn leads to high rates of failure of export activities;
- Lack of planning or rational analysis of internationalization;
- Lack of governmental information;
- Passive marketing behavior or management not committed to international markets;
- Strong ties as companies can be heavily involved in local, regional and national activities; the reasons that foster these organizational habits can be difficult to change;
- Risk awareness and resistance to change.
- Shortage of working capital;
- Identifying foreign business opportunities;
- Limited information to locate/analyze markets;
- Inability to contact potential overseas customers;
- Obtaining reliable foreign representation;
- Lack of managerial time to deal with internationalization;
- Inadequate quantity of and/or untrained personnel for internationalization;
- Difficulty in matching competitors' prices;

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- Lack of home government assistance/incentives;
- Excessive transportation costs;
- Liability of outsidership;
- Liability of foreignness.

It is also worth noticing that international experience is an important factor in the export activities of start-ups (Bloodgood, Sapienza, & Almeida, 1996; Reuber & Fischer, 1997; Stucki, 2015).

As start-ups do not have great experience and international credibility, the initial human capital and founders' skills are seen as crucial elements in the company's internationalization (Reuber & Fischer, 1997). As founders are the key decision makers (Stucki, 2015), they need to be able to discover, evaluate and exploit new business opportunities (Schweizer, 2012). However, during the process of internationalization they deal with high degrees of uncertainty and ambiguity (Acedo & Jones, 2007; Chandra, Styles, & Wilkinson, 2009).

Human capital is directly related to a company's ability to identify and exploit external market opportunities and to manage business operations (Reuber & Fischer, 1997). Consequently, the founders' human capital affects: the probability of start-ups receiving funding (Hsu, 2007); the survival of the company (Gimmon & Levie, 2010); and exerts a fundamental influence on growth (Colombo & Grilli, 2005). In short, human capital does not only affect the overall performance of the company, but is also crucial for the export activities of start-ups.

Although the founders may not have specific human capital at the foundation of the company, it can be acquired over time through (Gibbons & Waldman, 2004): learning; socializing with other stakeholders of the in social networks; improving sector specific knowledge; and acquiring knowledge relevant to the management of the company. In addition, as companies grow older, many of them also gain experience in exporting.

This evidence leads one to believe that creating a start-up requires knowledge in many different areas. Thus, it is imperative to have a clear understanding of the differences in language, culture, technology, logistics, and law between exchange partners in order to decide the best alternative to internationalize (Styles & Ambler, 1994; Verwaal & Donkers, 2002). At the same time, it requires a specific knowledge regarding finance, production or marketing management (Schweizer, 2012).

### **International New Ventures / Born Globals**

BGs are companies that expand to international markets, taking advantage of both new global contextual conditions and new needs, based on rapid internationalization approaches (Ribau et al., 2015), which pinpoint the ineffectiveness of the traditional theories of internationalization. However, the research that has been developed so far does not seem to be enough to anchor a new consensual theory about the definition of new internationalization phenomena (Ribau et al., 2015).

In short, BGs can be characterized as business organizations that, from the outset, seek competitive advantages from the use of resources and the sale of products in several countries (Weerawardena et al., 2007; Coviello, 2015). On the other hand, INVs are companies that from the beginning seek to obtain competitive advantages, through the use of their internal resources, through international sales (Oviatt & McDougall, 1994). INVs arise through the exploration of entrepreneurial orientation, i.e. the propensity to take risks; proactive behavior; innovation and commercial aggressiveness (Coviello & Cox, 2006).

Over time, they create images based on the level of service they offer, which affects end consumers and the choice at the time of purchase.

In this chapter, despite some conceptual specificities that still set apart INVs and BGs, both typologies (INVs/BGs) are going to be used indistinctively.

INVs/BGs are companies that generally start as domestic institutions and internationalize as they grow and identify opportunities for expansion (Vanninen, Kuivalainen, & Ciravegna, 2017). As a rule, BGs present themselves as domestic companies that begin their internationalization by exporting products, only subsequently choosing to enter other geographical locations when they find more favorable conditions for their growth (Vanninen et al., 2017).

The main characteristics of INVs/BGs are the following ones (Ribau et al., 2015):

- Global perspective and aims from the beginning of activity;
- Managers with previous international experience;
- Access to international networks;
- Technology-based and highly specialized companies.

## **Modes of Entry in International Markets**

The modes of entry in international markets are extremely important since they allow companies to ensure a greater proximity to the customer (Lu & Beamish, 2001).

Typologies of modes of entry in international markets are based on the degree of involvement in external markets, which in turn depend on the level of resources (investment) involved in external markets and on the degree of control over international operations (Grünig & Morschett, 2017; Moreira, 2004).

There are two different modes of market entry (Calabrese & Manello, 2018): exports, which involve production in the domestic market (direct export and indirect export), and a second type of entry mode that involves production abroad (production contract, licensing agreement, franchising agreement, technology transfer, service contracts, management contracts, strategic alliances, joint ventures and total ownership through direct foreign investment).

These two modes of entry involve different costs and benefits (Katsikeas, Leonidou, & Samiee, 2009). There are clearly important differences in these two modes of entry, since exporting products to the destination market / country involves fewer resources and risks than the second mode of entry where there is the possibility of transferring the firm's resources (technology, capital and human labor) to a foreign country. Equally important is the fact that the products are sold directly to the end customer or shipped to be produced and sold in the destination market.

Grünig and Morschett (2017) propose the following modes of entry in international markets: exports (indirect, direct and own exports); contractual modes (licensing out; management contracts; international outsourcing); and foreign direct investment (acquisitions; joint-ventures; strategic alliances; partially or 100% controlled subsidiaries).

Exports are the most basic form firms use to address international expansion (Salomon & Shaver, 2005). Indirect exports occur when the company does not develop particular efforts in terms of international marketing, being dependent on third parties to sell in international markets (Moreira, 2004; Grünig & Morschett, 2017).

Although export activities demand resources, they can be carried out to obtain resources, i.e. to find, commit, direct, coordinate and evaluate external resources for export (Christensen, 2006).

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Larger export volumes allow firms to achieve economies of scale and scope and, consequently, increase: labor productivity; management efficiency; cost savings; and profitability. Other indirect benefits should consider learning and experience that involve and exploit tangible and intangible resources more broadly (Ramaswamy, 1992; Giachetti 2012).

Exporting activities can be divided into three distinct forms: direct, indirect and own exports.

Direct exporting occurs when the company sells to an importer from a foreign country (Simões & Esperança, 2013). Direct exports means that the company does not delegate any international marketing operation to third parties, using its own resources in the exploration of international markets.

Indirect exporting occurs when it involves the use of intermediaries, such as import-export agents, trading companies, sub-contractors and central purchasing centers of large distribution chains located in the country of origin (Simões & Esperança, 2013).

Clearly, indirect exporting require less resource involvement and less risk than direct exports (Grünig & Morschett, 2017), since they do not involve gathering information and establishing the distribution, communication, and pricing policies / strategies in international markets.

In short, indirect exports may be a good option for companies that occasionally sell products abroad and / or if international sales occur in countries where it is difficult to build specific knowledge (Grünig & Morschett, 2017).

There is also the own exporting activities that result from direct sales to the final customers in the country of destination, without intermediaries. In this case, the exporting company is responsible for the marketing and distribution of its products.

Licensing agreements involve a deal signed between at least two parties where one company concedes the other company the right to use certain knowledge and / or to exploit industrial property rights (trademarks, patents, designs or designs) against a certain payment, usually through royalties (Grünig & Morschett, 2017). On the other hand, franchising is a specific form of licensing in which a franchisor licenses franchisees for them to market or produce a product / service in a particular territory or country, according to the business model created by the franchisor (Grünig & Morschett, 2017). Finally, international outsourcing involves an agreement between an international company or one that intends to internationalize (contractor), and a company in the country of destination (subcontracted), which manufactures the products or components thereof.

Acquisitions involve the purchase of companies in the target markets and privileged access to their resources and their knowledge of customers and other stakeholders.

Joint ventures involve the participation of several companies in the capital of a business unit, in order to develop a productive and / or commercial activity, thus giving rise to the sharing of their assets, profits and business risk (Grünig & Morschett, 2017; Moreira, 2004). In turn, strategic alliances can be understood as a combination of two or more organizations to achieve common strategic objectives and encompass several situations of commercial relations between companies from different countries, often competing among them.

## **Relationship Orientation**

Several studies suggest that internationalization is no longer just related to country specificities, but to specific business relations (Hånell, Nordman & Tolstoy, 2017). Following this logic, unlike distant relations mostly based on transactions, the most important business relationships of an international organization are based on strong long-term commitment strategies (Johanson & Mattson, 1988).

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This situation is justified by the fact that long-term relations promote knowledge development that leads to change and provides organizational evolution (Johanson & Mattson, 1987). Therefore, business relationships have the potential to facilitate the learning process, which in turn allows companies to meet the needs and requirements of specific markets in constant change, enabling faster and more innovative responses to their clients' needs (Hånell et al., 2017).

Close long-term business relations between customers and suppliers are important as they drive internationalization decisions through collaborative business strategies, considering partners as part of the organizational strategy (Johanson & Vahlne, 2009). These types of relations develop through social processes of interactive and sequential sharing which results in gaining knowledge and building trust and commitment, enabling companies to achieve their goals (increased productivity, better and faster customer service, among others) (Johanson & Vahlne, 2009).

In brief, relationship orientation is a concept that seeks to determine how firms interrelate with each other, being this concept more specific than market or customer orientation as it considers high levels of trust, commitment and reciprocity (Carvalho & Moreira, 2016; Moreira & Alves, 2016). Relationship orientation requires not only that firms cooperate closely with each other but also that they overcome situations of conflict in order to achieve common goals (Carvalho & Moreira, 2016; Moreira & Alves, 2016).

## **3D PRINTING**

### **Brief History of 3D Printing**

Two different techniques can be used in the making of an object: subtractive technique, related to Computer Numerically Controlled (CNC) machining; and additive technique, referred to as Additive Manufacturing (AM) process (Gibson, Rosen, & Stucker, 2015).

AM technology, popularly known as 3D Printing, is nowadays used by makers around the world, but its beginning can be registered in the 1980s, when it was called Rapid Prototyping (RP) (Gaubatz, 1996). RP was conceived as a fast and economic method for prototyping the product development within a given industry.

Just like the industrial revolution, the assembly line, the advent of the Internet and the social networks phenomenon, 3D printing will “change the rules of the game”. According to Wohlers (2015), the world-wide 3D printing market, which includes printers, services and printing systems, components, products and after-sales services, is estimated to have grown by 25.9% in 2014, and reached a total of \$ 5.2 billion by the end of 2015, the sales volume of 3D printers representing \$ 2.4 billion of that total market.

OMEGA is currently positioned in a sub-segment of this market, the Desktop 3D printing segment, defined at a retail price below 5000 € per unit. Sales growth in the Desktop segment grew 69.7% in 2015, reaching a total of 278,385 units, with a sales value of US \$293.6 Million (Wohlers, 2015).

3D printers are becoming increasingly accessible and in the near future they will be easily found in any home, just as their two-dimensional counterparts are found today (Kietzmann, Pitt, & Berthon, 2015).

Compared to other manufacturing techniques, anyone can easily design through a 3D printer without having to master complex processes or require operational skills (Hu & Yin, 2014). With this, one just needs to draw the part on a computer, convert the process into a digital STL format and then send the

request to the 3D printer (Hu & Yin, 2014). It is expected that 3D printers will become increasingly popular just as regular as personal computers did in the past (Hu & Yin, 2014).

## **RESEARCH METHOD**

The case study methodology, proposed by Yin (2004), is one of the ways to investigate a contemporary phenomenon within its real-life context, where the limits between the phenomenon and the context are not clearly defined. It is one of the most common research methods used in social sciences as it is particularly useful when one looks forward to understanding, exploring and describing events and complex contexts, in which diverse factors are simultaneously involved and in which researchers have a weak control over the real occurrences (Yin, 2004).

This case study is of an explorative nature as the knowledge base used is underdeveloped (Doherty and Alexander, 2004; Yin, 1994). It draws on the interpretive research tradition, as qualitative techniques and descriptive data was used.

The qualitative research design, provides a holistic yet focused means of data gathering, analysis, interpretation, and understanding that is particularly suited for research that investigates the “why” and “how” of management decision-making in organizations (de Massis & Kotlar, 2014). Moreover, this case study method is particularly useful, as a qualitative methodology, to explain complex and dynamic realities (Malhotra, 2017).

According to Easton, Wilkinson, and Georgieva (1977), this type of methodology is also appropriate to investigate industrial networks and international market entry strategies because of its complexity and dynamism, which limits the application of positivist studies.

The qualitative analysis of data followed an inductive process and observed the recommendations of Morse (1994) and Lindlof (1995).

Considering the exploratory nature of this research, the case study method is appropriate to address the objective identified in the literature. The firm was chosen because it exhibited contextually rich data on the internationalization processes, supporting empirical research in the real-world setting (Eisenhardt, 1989).

The data collection process included different sources of information (interviews, background information and secondary) in an attempt to triangulate findings.

This type of methodology does not try to find ultimate truths, but to report open accounts to data obtainment, analysis and interpretation.

## **CASE STUDY**

### **History, Mission and Objectives**

OMEGA is a start-up that was born in the Business Incubator of the University of Aveiro in 2011. Currently its headquarters are located in Ílhavo, a county in the district of Aveiro, Portugal.

OMEGA is one of the main manufacturers of 3D printers in Portugal and was one of the primary drivers in the development of this concept in Portugal.

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This project resulted from the creative idea of two former students of the University of Aveiro who began the development of the first low-cost 32-bit electronic board for 3D printing. This electronic board was the first product marketed by OMEGA, which was followed by the development of their first 3D printer.

OMEGA's mission is to "imprint change" as they believe that 3D printing will change the paradigm of mass-production, bringing it closer to the individual consumer in a way as to take them into a more leisure-oriented society. This start-up considers personal creative expression to be a way to the future.

OMEGA's main goals are to deliver innovative and reliable solutions to the market and to develop technology for tailor-made projects. In order to reach these goals they focus on 3 important objectives:

1. To be at the cutting edge of the 3D desktop printing business by developing, delivering and generating friendly solutions with innovative approaches and exceptional design and quality. At the very core of their values is a deep preoccupation with sustainability since they argue that 3D printing is not a conventional way of going about things, but one that will allow great improvement and progress on a global scale.
2. Construction and nurturing of close long-term relationships with customers, partners and collaborators. As they argue that success is a goal that cannot be achieved without a strong relationship between all these stakeholders which is why they focus on people's personality and creativity.
3. Commitment on challenging the *status quo* of 3D printing. The local community has a strong contribution by encouraging OMEGA's intensive work and participating in the creative process of product development. The idea is to get 3D printing closer to people; therefore, OMEGA's products are committed to challenge the *status quo* of 3D printing as it is known. In general, the appeal to the community and the investment on this kind of networking helps OMEGA bringing 3D impression to the "next level".

## **Product and Service Portfolio**

Currently OMEGA offers a wide range of products and services. The following ones are among OMEGA's main products:

- 3D PRINTERS (printers for different markets / target segments): for domestic and professional use; for the 3D printer Makers; for the educational market (from Pre-School to University Education).
- SUPPLIES (filaments for printing) in four different types of materials: Poly-Lactic Acid (PLA), which is easy to use and commonly used in home and office contexts; thermoplastic polyurethane, which is a highly flexible material; copolyester, which is very resistant and has excellent mechanical properties; NYLON, which is resistant and semi flexible material.
- Printing support accessories: Printing table; spatula and forceps; maintenance kit; conveyor box; various components for the makers to build up the printer; power supplies.

The different types of filaments are available in various colors and have applicability in all commercial printers, except for a 3D printer for the domestic material that supports printing in PLA.

OMEGA provides three main services. A three-dimension validation and printing service, in which the objective is that the user designs a template for printing, go to one of the 3D printers and through a

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pen drive, choose the color for printing and wait for the printed part. This concept of service incorporates the strategy that aims to get 3D printing to the maximum possible target.

A second service is no more than the possibility of extending the standard warranty derived from the purchase of an OMEGA's 3D printer.

Finally, there is software that is made available online for download at no cost to the user. The download of this software may only be performed on some OMEGA's 3D printers.

### **Main Projects**

The MELT project, the European Space Agency (ESA) together with other entities, allowed OMEGA to develop a printer with unique features. This project aimed to design and develop an Additive Layer Manufacturing (ALM) test card capable of printing functional 3D printing parts on the International Space Station with high performance polymers in a microgravity environment (gravity 0).

The 3D International Expansion project began in 2015 with the objective of promoting the internationalization of OMEGA by implementing a *“geographic markets diversification strategy based on the launch of new products.”* As a result, OMEGA is trying to exploit a market penetration and market expansion strategies in high-growth markets.

The international promotion of a new printer, the result of its strong commitment to innovation and research and development (R&D), *“aims to respond to the needs of a more demanding and sophisticated market segment.”* This new printer will stand out by a set of technological more sophisticated features.

### **Market Results**

OMEGA has seven years of activity focused on the *“design, development and commercialization of 3D printers.”*

The national and international markets have a balanced weight in OMEGA's sales volume (varying between 40%-60%) that represented in the year (2017) a total of 408,000 €.

Currently OMEGA has 25 employees that are *“creative and passionate about technology”*, of which 90% hold higher education degrees. The team is also distinguished by a strong R&D and innovation orientation. 70% of the employees who have embraced this project from the beginning are still in the company.

Looking now at the international expansion strategy, OMEGA began marketing products abroad in 2013, but in 2014 they consolidated their presence globally. According to the latest data (2017), they are present in 33 countries, in several continents. The most relevant markets are *“UK, Australia, Netherlands, Middle East, France, Italy”* and future prospects are to strengthen their presence in *“North America, Latin America, Germany and Nordic countries.”* The factors that influence the selection of these destinations are: the potentiality of the business; the investment that is being made in education; Industry 4.0 and the Internet of Things (IOT). The destination that represents a greater effort on the part of the sales is Brazil, due to intricate customs barriers. The mode of entry in these markets is done through direct export, by agents and distributors, and indirectly by resellers.

Among the reasons that supported the leapfrogged internationalization process, are the following ones: increasing market share; profitability of the company; new business opportunities; little acceptance of the national market; brand awareness and recognition; and benefits and incentives of the Portuguese State.

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OMEGA is involved in intense business intelligence analysis to gather information on the target markets. The mode of entry in these markets was based on the information gathered from secondary sources and from visits and presences at international trade fairs. Both the role of social networks and networking activities abroad have also been important.

The main obstacles felt in the internationalization process are the following ones: bureaucratic issues; language / cultural issues; technology and lack of information about international markets. OMEGA is trying to maintain close contact with entities related to internationalization activities, as is the case with AICEP in order to mitigate this impact of the liability of foreignness. For that they are trying to gather *“more information about the bureaucracies with the competent entities, investment in information sharing / evangelization of technology.”*

The financial support was essential in OMEGA’s internationalization process. OMEGA’s representatives give some recommendations to future start-ups that follow the internationalization path namely that they *“study the various markets and the competition; differentiate; and prepare to invest in communication and evangelization of the product / service”*.

## **DISCUSSION**

This section presents a discussion based on OMEGA’s performance/internationalization path and a comparison with the literature review carried out, so that data can be analyzed regarding the internationalization strategy adopted by this Portuguese start-up.

Table 1 relates the results found in this case study and the theories analyzed. It shows that the key aspects of the strategy adopted by OMEGA, in general, concur with the main literature carried out in the third section of this chapter.

It is important to note that, due to its small size and restricted human and financial resources, it is not surprising that OMEGA has chosen low commitment entry modes in international markets, such as Export. Following this, and given its rapid internationalization path, one can claim that OMEGA follows the typical profile of a BG/INV, as shown in Figure 1.

Based on the Uppsala model, it was found that there is a very limited connection with this theory. For example, OMEGA did not opt for markets with low psychic distance, *vis-à-vis* the traditional perspective poses. However, one can claim that OMEGA could have used the “International 3D community” (e.g. discussion forums, consortium of firms, open-source technology, etc.) to reduce its psychic distance to familiar markets and to deploy contacts or networking activities in this technology-based community.

In fact, OMEGA’s internationalization process was neither slow nor sequential, since the product global distribution was materialized soon after OMEGA was set up.

According to the network-based theory, the web of contacts represents an important activity, regarding the establishment of partnerships with local and international agents, which have allowed an early internationalization and a continuous interest in the expansion for new markets.

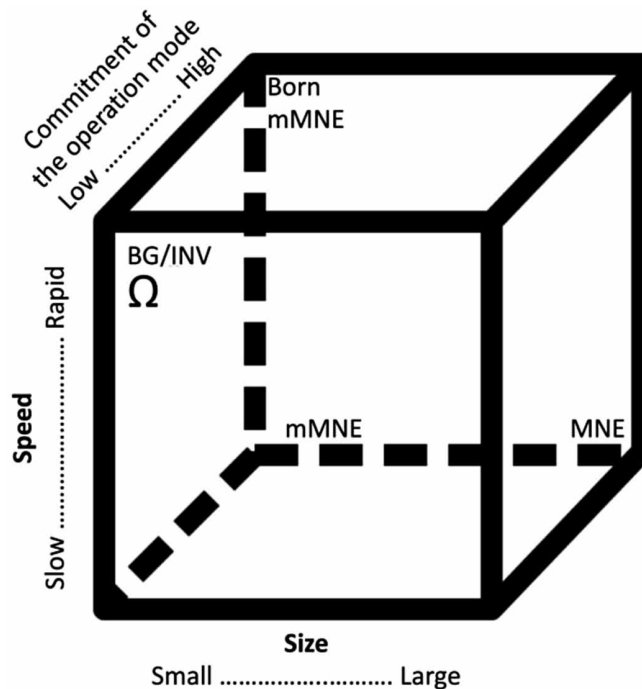
Furthermore, there is an extensive network of national and international partners that allows OMEGA to have access to important resources (e.g. financial resources, knowledge, skills, etc.) that otherwise would not be so easily available.

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*Table 1. Empirical review and theoretical match in the case of OMEGA*

Empirical Review	Theoretical Review
<ul style="list-style-type: none"> <li>• OMEGA's expansion process through exports;</li> <li>• Not limited to the domestic market;</li> <li>• Establishment of network positions in several markets;</li> <li>• Representative market scope: 33 countries in several continents;</li> <li>• Importance of field work (search for new ideas);</li> <li>• Financial capital (CEO's own investment).</li> </ul>	Internationalization of start-ups
<ul style="list-style-type: none"> <li>• Rapid internationalization;</li> <li>• Global positioning (presence in several continents);</li> <li>• Reinforce/expand its presence in specific markets (North America, Latin America, Germany and Nordic Countries);</li> <li>• Small enterprise (25 employees);</li> <li>• Low commitment entry mode (exports);</li> <li>• Gradual knowledge construction, result from the attendance at fairs; search on specialty websites; demand for information about foreign markets bureaucracies with the competent national authorities (AICEP) – proactive conduct;</li> <li>• Second stage of the process: export by independent representatives (agents and distributors).</li> </ul>	BG/INV
<ul style="list-style-type: none"> <li>• Development of closer and consolidated relationships: the strong contribution of the local community supports and encourages the intensive relational work;</li> <li>• Networking clearly present in SMEs: agents, partners and distributors;</li> <li>• Intensive search for opportunities: attendance at fairs, presence on social networks and network of contacts (AICEP);</li> <li>• Collaborative strategies: partnerships in common projects.</li> </ul>	Network-based theory
<ul style="list-style-type: none"> <li>• Construction and maintenance of close and lasting relationships with clients and partners;</li> <li>• Win-win relationships: success is a goal that cannot be achieved without the close relationship with and among these agents. The main focus is people: their personality and creativity are printed daily in what they do.</li> </ul>	Relationship orientation

*Figure 1. Positioning of OMEGA as a BG/INV*



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*Table 2. Overview the case study*

	<b>OMEGA</b>
Number of Employees	25
Product portfolio (3D printing sector)	3D printers, Filaments, Printing support accessories.
Exports (%)	50%
International profile	Proactive profile - search for new markets; Attendance of international fairs and pursuit of international contacts / social networks and contact networks.
Foreign market entry mode	Direct export (through agents and distributors) and indirect export (through resellers).
Main markets	UK, Australia, the Netherlands, Middle East, France and Italy.
Relationship orientation	Construction and maintenance of close relationships with clients, partners, employees and local entities are crucial.
Network relevance	Highly relevant to the activity and to the international expansion. Presence in different consortiums. Large network of national and international partners (University of Aveiro, University do Minho, Siemens, Microsoft, University of Texas at Austin, among others).
Main resources	Specialized human resources, creative and passionate about technology (50% in R&D and Innovation department).
Intellectual Capital	Extensive expertise of the CEO and the marketing and sales department executives.
Relationship reinforcement aspects	International 3D printing community; Discussion forums; open-source technology; maker community; Projects with other entities.
Exit of foreign markets	Brazil is a possibility, since this market demands a significant sales effort due to customs barriers. Insignificant sales volume.
Prospects for future internationalization	Reinforce the presence in North and Latin America; Germany and Nordic Countries.

Based on the network-based theory, one can claim that OMEGA has been implementing a relationship orientation market strategy since it has been involved in collaborative business strategies (e.g. MELT project, as well as in the international 3D community), considering partners as part of the business strategy, encouraging win-win relationships.

## **CONCLUSION**

The internationalization of a start-up, such as OMEGA, follows the common standards of the main theories and internationalization modes applied to most SMEs. Table 2 summarizes the case study presented.

According to the theoretical framework and given its rapid internationalization and the option to export as the main way of entering in the international markets, one can claim that OMEGA follows a similar profile of that of a BG / INV. Moreover, although there is some correspondence to the Uppsala model, it is quite limited. On one hand, the network-based theory is clearly present since there is a crucial relationship with partners and local and international entities. On the other hand, the construction and maintenance of close and lasting win-win relationships with the different stakeholders expresses the relationship orientation.

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## **KEY TERMS AND DEFINITIONS**

**Born Global:** It is a type of company that from the beginning of its activities pursues a vision of becoming global and globalizes rapidly without any preceding long term domestic or internationalization period.

**Case Study:** It is a qualitative research method normally used in social sciences. It seeks to interpret a reality through a particular perspective.

**Contextual Conditions:** They normally characterize a country, a region, or a market, based on a set of political, social, economic, and cultural dimensions, which are useful to depict how those contextual conditions differ across countries, regions, or markets.

**Globalization:** It is a worldwide movement toward economic, financial, trade, and communications integration. It is normally envisaged as a lack of trade barriers between nations, which are removed through free trade agreements throughout the world and between nation states.

**International New Venture:** it is a business organization that, from inception, seeks to derive significant competitive advantage from the use of resources and the sale of outputs in multiple countries.

**Internationalization:** It is the process of increasing involvement of enterprises in international markets. It involves a strategy carried out by firms that decide to compete in foreign markets. It involves cross-border transactions of goods, services, or resources between two or more firms or organizations that belong to two different countries.

**Internationalization Process:** It involves the emphasis of a trajectory of a company in its transition from a national market to a particular foreign market. It normally involves several entry modes (exports, FDI, franchising, etc.) that exert a critical influence on the subsequent trajectory, as well as on cost related to the internationalization process.

**Network-Based Approach:** It based on the industrial networks theory, which states that firms evolve on the basis of established relationships. It considers the companies' internationalization process through their integration into networks and relationships.

**Relationship Orientation:** Is a concept much more specific than market orientation. It involves the commitment of one party that believes that a relationship is worth working on to ensure that it endures throughout time. The relationship orientation is built on the foundation of mutual trust and commitment.

**Small and Medium-Sized Enterprises (SMEs):** Although there are plenty of definitions across the world, the working definition used in this document is the one that was created by the European Commission, to permit a coherent and effective access of SMEs to European community funds.

**Uppsala Model:** It has been one of the most discussed dynamic theories. It explains the process of internationalization of companies, namely how organizations learn and the impact of learning on the companies' international expansion.