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Faculty of Economics and Business

Final Degree Project

The relationship between internationalization and innovation: a micro view

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Abstract

The aim of this Final Degree Project is to contribute to a better understanding of the relationship between internationalization and innovation strategies at the firm- level. For that purpose, first an individual examination is conducted on each of these two phenomena, in which is not only addressed what they are, but it is also emphasized the most relevant theoretical foundations that explain them, their types, and possible ways to measure them. Subsequently, a depth analysis is performed about the relationship between them. The analysis consists on a review of the empirical literature on each of the three possible directions in which the relationship can take place: 1) the impact of innovation on internationalization, 2) the impact of internationalization on innovation, and finally, 3) the interrelationship or reciprocal relationship between both. The findings show, in general, the existence of a clear relationship between internationalization and business innovation.

Word count: 13,652.

Keywords: Internationalization; Innovation; Competitive advantage; Learning by exporting; Complementarity.

Resumen

El objetivo de este Trabajo de Fin de Grado es contribuir a una mejor comprensión de la relación existente entre las estrategias de internacionalización e innovación a nivel empresarial. Para ello, en primer lugar se lleva a cabo un estudio individual de cada uno de estos dos fenómenos, en el que no solamente se aborda en qué consisten, sino también se incide sobre los fundamentos teóricos más relevantes que los explican, sobre sus tipologías, y sobre las posibles formas para medirlos. Posteriormente se realiza un análisis en profundidad sobre la relación entre ambos. El análisis consiste en una revisión de la literatura existente sobre cada una de las tres posibles direcciones en que la relación puede tener lugar: 1) el impacto de la innovación en la internacionalización, 2) el impacto de la internacionalización en la innovación, y por último, 3) la mutua relación entre ambas. Las conclusiones permiten sostener, en general, la existencia de una evidente relación entre la internacionalización y la innovación empresarial.

Número de palabras: 13.652.

Palabras clave: Internacionalización; Innovación; Ventaja competitiva; Aprendizaje mediante la exportación; Complementariedad.

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Introduction

Two of the main factors that stand among the economic variables determining the conditions of competitiveness and business success for both companies and countries are internationalization, on the one hand, an innovation, on the other (Vila and Kuster, 2007). They are also considered to be the most complex strategies that a company can carry out. Numerous empirical studies, either qualitative or quantitative, longitudinal or cross-sectional, have been carried on internationalization and innovation separately. Nonetheless, literature review of the existing relationship between both has not been so deeply analyzed, and there is an increasingly aware of the need for disentangle the direction of causality between internationalization and innovation. Consequently, the aim of this Final Degree Project is to contribute to a better understanding of the relationship between internationalization and innovation strategies by conducting a literature review on the topic. In order to delimit the scope of study, the relationship will be analyzed only at the firm-level, leaving aside the country-level. Hence, it will consist on a micro-review of the relationship. For that purpose the methodology followed consisted in a bibliographic compilation of both relevant academic articles and scientific studies that examine the relationship between internationalization and technological innovation. More specifically, we will focus on the most recent studies, as they are generally more consistent than the previous ones, since they take the latter into account and, at the same time, they take into consideration new lines of research. For the selection, we have also chosen rigorously studies published in leading journals from authors from different countries that are varied in terms of subject, ie. that they address different aspects within the relationship, trying to cover all the possible different points of view of the field of study. Regarding the structure of the project, it is divided into three sections: In the first two sections we gather and explain some conceptual and theoretical aspects related to both internationalization and innovation, but considering them in isolation in order to understand each of them. In particular we focus on their definition, measurement and principal theories.In the third section, we

review the relationship between internationalization and innovation in the three different ways in which this can take place: 1) internationalization as a cause of innovation; 2) innovation as a cause of internationalization; 3) innovation and internationalization in a reciprocal or mutual relation. Likewise, we divide each of those three sections into two parts: the first one is related to the theoretical justification of the relationship, whereas in the second it is gathered the empirical evidence, based on four studies on the direction of the relationship in question. A total of twelve cases are analyzed, four on each of the three directions of the relationship. Finally, the conclusions are exposed, and they are structured according to the sections in which this Final Degree Project is divided. We will also revise some of the limitations both of the scientific studies and of this Final Degree Project.

1. Internationalization

1.1. The concept of Internationalization and its measures

Internationalization, as well as globalization or cross-border expansion, tended to be a natural phenomenon that occurred in the evolution of firm's commercial activity. It was very common before The Second World War, however, it was interrupted by the restrictions on access to information and the free flow of goods during The Cold War. From the 80's, when globalization and market liberalization started, and with the development of information technology and communication, internationalization has become again a current relevant phenomenon.

Most of the attempts to define the concept of internationalization agree in emphasizing that this is a process by which the company increases its commitment to international markets. However, it is extremely difficult to find a description universally accepted.
Among the many proposals made, one that has had the greatest impact has been made by Welch and Luostariten (1988)[1], who consider the internationalization of the company as the process of increasing involvement in international operations. This term incorporates not only outward (direct and indirect exports or license) but also inward internationalization operations (such as direct or indirect imports or international subcontracting or repurchase agreements).

In a similar vein, Calof and Beamish (1995) broaden the former definition describing internationalization as the process of adapting firm's operations (strategy, structure, resources, etc) to international environments, so in this manner it is possible to include the divestment processes or ceasing internationalization (which also take part in the field of study of internationalization).

[1] As stated in Peris, M. L. F. (2003). *La influencia de la innovación tecnológica sobre el comportamiento internacional de la empresa*. Instituto de Estudios Económicos, p.25.

More recent scholars, such as Javalgi, Griffith and White (2003) define internationalization in an easier manner as the process through which a firm moves from operating solely in its domestic marketplace to international markets.

Before analyzing the different theories of internationalization we should introduce the dimensions of this phenomenon. In accordance with Johanson and Vahlne (1977) there are three outstanding dimensions in the internationalization of the firm, which are the following:

- **The international market selection**

The main idea arising here is that physic distance[2] distorts the obtainment of market information, and consequently foreign markets that are initially selected will be psychologically closer to the firm's domestic market. Later on, the firms will expand to more geographically distant countries.

- **The entry mode choice**

A firm was thought to be traversing a sequential set of phases, from indirect exporting (assuming that firms start to export accidentally, with the lowest level of risk) to direct export formula, consisting on three alternatives of exportation: through firm's representatives who act on the company's behalf, export agents or distributors who buy the product from the exporting firm to resell it, or through wholly owned production-oriented subsidiaries. Exporting is the most prevalent form among the many different ways of international expansion: It has been much more used and examined, in general, than Foreign Direct Investment (FDI from now on, which is a controlled ownership through the placement of long-term capital into business enterprise in a foreign country by an entity based in another country) or licensing (in which a licensor company offers the right to use the product trademark, know-how, brand name or copyright or even the manufacturing process to another company called the licensee, who pays a royalty to the licensor). The reason why exporting is usually the preferred way of internationalization is because it is relatively easy and fast to enter foreign

[2] Which is defined by Johanson and Wiedersheim-Paul (1975) as *"the sum of factors preventing or disturbing the flows of information between firms and markets"*.

markets, since it involves a lower level of commitment and risk than other forms of international expansion.

- **The pace of internationalization**

The rhythm of internationalization was considered as a period of domestic growth followed by an incremental international expansion. However, many technology-based studies on companies' internationalization behaviour contradicted this. For example, in recent years, scholars have centered their attention on the time aspect; obtaining results that indicate that time may not be the only explanation to why firms begin to internationalize (Rialp and Rialp, 2001). There is an emerging concept of Born Global firms, which we are going to analyze further in the following section.

Among the many measures used for internationalization, there are the stock of inward and outwards FDI; exports (measured by the decision to export, which is called export propensity; or by the proportion of a firm's total sales that are represented by exports, which is export intensity); and the number of parent transnational corporations in the country. However, the most relevant one is the Transnationality Index (TNI), developed by the United Nations Conference on Trade and Development (UNCTAD). It is the result of the arithmetic mean of the sum of the following three ratios: ratio of foreign assets to total assets; ratio of foreign sales to total sales, and ratio of foreign employment to total employment. This represents the relationship between home and foreign activities for any particular company; consequently, a company is considered to be very internationalized if the ratio is very high, regardless of whether the foreign activities take place in one single foreign country or in many of them.[3] Thus this index allows for a ranking of multinational corporations.

[3] According to Ietto-Gillies, G. Seccombe-Hett (1997) T., WHAT DO INTERNATIONALIZATION INDICES MEASURE?, Centre for International Business Studies, p.3.

1.2. Theories of internationalization

We are going to make a review of the main theories about the international expansion of firms, examining the fundamental principles of this phenomenon. These theories can be classified into two groups depending on its approach (Cardozo, Chavarro and Ramírez, 2013). On the one hand, there is the economic approach, which poses as a central issue why there are multinational companies. On the other hand, the process/organizational approach, that is based, such as its name suggests, on how the process of internationalization of the company is developed.

1.2.1. Internationalization from an economic perspective

Theories that examine the internationalization of the company from an economic point of view stem from the consideration of rational economic decision-making processes of business international expansion (Buckley and Casson, 1976; Rialp and Rialp, 2001), which are based on the comparison of costs and economic benefits of such decisions.

1.2.1.1. Traditional view and Classical International Trade Theory

Traditionally, internationalization has its origins in the Classical International Trade Theory, which pointed out that countries tend to specialize in producing goods and services with lower production costs. We can observe that international trade is a consequence of specialization and division of labour. Therefore, each country would produce and export the products that it produces more efficiently, and would import the ones in which it would not have production efficiency. Adam's Smith Absolute cost advantage and David Ricardo's Comparative cost advantage are encompassed under this particular view.

A more contemporary view is given by the theories that explain the process of internationalization attending to costs and economic advantages of this process. Among these, Hymer and Vernon should be highlighted, but we are going to focus specially on Dunning.

1.2.1.2. Dunning's Eclectic Paradigm

It is one of the most relevant theories of internationalization, since it assembles the contributions of several theories of both economic and process approaches, and it is very influential for empirical investigation of determinants of Foreign Direct Investment (FDI). It is also known as the OLI Model or OLI Framework, due to the classification of advantages by the author in 3 types: ownership (O), location (L), and internalization (I) advantages.

According to Dunning, there are four conditions that must be taken into account by a company to choose to exploit its competitive advantages abroad through FDI, becoming a MNE (Multinational Enterprise):

1) Ownership advantages: The company must have its own advantages, compared to local firms, in order to take part in foreign markets. These advantages may occur due to the possession of property rights or intangible assets (such as organizational capacity, know-how, human capital or technology) by the enterprise. Other advantages are due to the fact that the company is an already established business against new companies (for example, size, diversification, expertise, economies of scale, ease of access to resources etc.).

2) Internalization advantages: For the company owning the mentioned advantages it will be much more convenient to exploit them by itself rather than to sell them to other foreign companies. In other words, it is more profitable that the firm integrates the activities within the company.

3) Location advantages: Locating certain production plants abroad should be profitable for the company, that is, there must be advantages derived from the location of these plants abroad. For instance, market size, natural resources, costs of transport, or aspects of the infrastructures.

4) FDI must concur with the long run strategy of the company.

It is also important to emphasize that this paradigm is able to explain not only the causes of internationalization; but also its distribution among the various countries in which the FDI takes place, since the configuration of the OLI variables ultimately depend on the specific characteristics of the country, industry and company.

An illustrative chart (Chart 1) of the choice of FDI over other mechanisms of internationalization (export or license) in relation to OLI Model is shown below:

John H. Dunning (1981)		TYPES OF ADVANTAGES		
		Ownership advantages	**Internalization advantages**	**Location advantages**
ENTRY MODE TO THE MARKET	**Licensing**	Yes	No	No
	Export	Yes	Yes	No
	FDI	Yes	Yes	Yes

Source: Own elaboration based on Dunning's Eclectic Paradigm.

1.2.2. Internationalization from the perspective of the process

Under this category are grouped the theories which consider the internationalization process as a mechanism for incremental commitment to learning based on the accumulation of knowledge, as well as on the increasing resource commitment in foreign markets (Johanson and Wiedersheim-Paul, 1975). They describe how domestic firms become multinational companies and the different steps or levels of the process that leads to internationalization.

1.2.2.1. The Uppsala Model

This model is the most noteworthy of the theories of this group. It indicates that the company will gradually increase resources or intensify activities in a foreign market as it gains experience on the activities in this particular market (Johanson and Wiedersheim-Paul, 1975; Vernon, 1966). The process consists in successive stages, each of them represents an increasing degree of involvement in the firm's international operations. The general features of the different stages (Cardozo, Chavarro and Ramírez, 2013) are the following:

1) Occasional or no regular export activities
2) Exports through independent agents
3) Establishing a commercial subsidiary in a foreign country
4) Establishing productive units abroad

Nevertheless, each author has his own model, including more or less steps in the development of internationalization. In general, the process begins with the firm begins in the domestic market without having exports and little or none experience. However, once the firm establishes a strong domestic market it starts exporting, and so increasing the resources committed, while generating more experience and knowledge about the country. Finally, when it establishes a product unit abroad, it has already accumulated experience that allows it to get information on the productive factors in the destination country.

Apart from this, it is necessary to mention the "psychological distance" concept, which means that, when entering to a foreign market, a company will start its operations from culturally and/or geographically, or even linguistic, closer countries to the domestic market and then move gradually to more distant countries in both of these aspects.

1.2.2.2. The Born Global Theory

The emerging literature on internationalization challenges the traditional view that firms internationalize incrementally. This perspective is very useful for understanding the internationalization of the company in the XXI century. The concept of "born global" refers to startups that expand to foreign markets in the first years after its creation. The factors that determine their activity follow a global approach since its inception. Rennie (1993) defines it as firms that internationalize within two years of inception and have 75 percent or more of their sales in international markets.

The emergence of a born global is related to three factors (Madsen and Servais, 1997):

- The new market conditions; particularly the increase in specialization (an increasing number of companies are producing specific product components) and hence, in market niches.

- Technological developments in areas of production, transportation and communication. Firms with new innovations are forced to internationalize quickly in order to benefit from first mover advantage (Chetty and Campbell-Hunt, 2004).

- The more developed skills of individuals, including the entrepreneur of the born global. Here we are referring to an improvement in the capacity of human resources to exploit technological changes in foreign markets, particularly, because the mobility of nationals abroad allows the company to gain international experience. Thus, human resources have become more homogeneous, and consumer preferences are no longer local.

2. Innovation

2.1. The Concept of Innovation and its measures

Numerous authors have insisted on the existence of two alternative ways to compete in the new context of global capitalism. On the one hand, lower costs in order to enhance competitive advantage (albeit this alternative is not desirable in the long run, because it often produces negative side effects in the social, labour and environmental levels). On the other hand, introduce innovations and constant improvements capable of generating dynamic and durable competitive advantages (Porter, 1991).

It is argued that science and technology are one of the multiple drivers of economic progress. In the same way, growth of national investments in innovation (that lead to new products, processes and increasing productivity) are essential to ensure economic growth of countries (Schumpeter, 1942). In fact, the creation and dissemination of knowledge, the technological and institutional change, and domestic technological capacity are seemed as a determinant of the economic development and welfare of nations (Fagerberg, 1988).

The concept of innovation has been studied for many years, and it is so generic that allows broad definitions. First of all, Smith, Gregory and Johnston (1994) describe innovation as "the introduction of a new phenomenon, or the phenomenon itself"[4]. At the economic level and even more precise is the definition given by the Organization for Economic Co-operation and Development (OECD, 2005) as "an interactive process initiated by the generation of new products and processes or of significant technological improvements in current products and processes". It can be interpreted as a productive application of an invention, implying any kind of change or improvement on the production system, usually understood as one that allows an

[4] According to Alonso, J. L., & Méndez, R. Innovación, pequeña empresa y desarrollo local en España, 2000. *Biblioteca Civitas Economía y Empresas, Madrid, España*.

increasing efficiency, quality, speed etc. Furthermore, it classifies the innovations in four different categories, which are the following: products (improve goods or services to ameliorate at the same time customer benefits and increase sales), processes (a new or significantly improved production or delivery method, including significant changes in techniques, equipment and/or software), marketing (significant changes in product design or packaging, product placement, product promotion or pricing) organizational typologies (new organizational methods in business practices, workplace organization or external relations aimed to reduce administrative costs or increasing employee satisfaction).

Historically, the innovation literature was focused on the role of internal research and development on firm innovation. In fact, the firms involved in Research and Development (R&D from now on) activities have been contemplated as technological innovative firms.

Nowadays, innovation is considered to be a factor of production of strategic nature, as it promotes the generation of a competitive advantage for companies. It is increasingly being regarded as a central issue in economic development. However, its scope is really wide and it is difficult to define.

Veugelers and Cassiman (1999) structure the decision of innovation as a two-stepped process, in which the firm firstly has to decide whether or not to carry out the process of innovation and secondly, which strategy to develop and how to acquire the necessary technology to succeed and achieve its goals.

We must differentiate the concept of innovation from the one of technology, being the latter understood as “the set of specific knowledge of a mechanical trade or industrial art”. The term “innovation” is wider than that of “technology”, what means that along with technological innovations, there are other types of innovation that also affect companies and the environment in which they operate. The technological strategy is related with the use of technological resources by the company to achieve a competitive advantage, whereas the innovation strategy refers to the decisions that involve the introduction of new products or process. The main difference arising here is that the former is focused exclusively in technology, while the latter is market-oriented.

Nevertheless, while in some occasions the definitions of innovation and technological strategy are differentiated, most of the times both names are used interchangeably to

refer to the same concept. Therefore, analyzing the process of innovation will mean not only to identify the management of the internal organization of the company, but also the intensity and technological improvements in both processes and products. Indeed, Tidd, Bessamt and Pavitt (1997) point out that there are very few texts or studies specifically dedicated to the innovation strategy, compared to the extensive literature that can be found around the technology strategy.

Another example is Molero, Buesa and Fonfría. (1998), who define innovative firms as the ones that execute activities on a regular basis, either by the creation of a new product or process, to obtain as a result an increase in their competitive advantage against firms belonging to the same market, or even open for them new markets, that is, making the firm grow. As can be noted, here Molero et al. (1998) is, implicitly, considering the technological innovation characteristics.

At this point we should take into account the classification of the different types of innovation. Propris (2002) divides innovation into four categories, which are the following:

- **Product and process innovation**

We have already explained the dichotomy of both of these innovations when examining the OECD definition of innovation. In summary, product innovation consists on the introduction on the market of new or improved product or service, hence it is related to its degree of sophistication (Miller, 1988); whereas process innovation refers to the sequences and nature of the production process and it is usually more difficult to detect.

- **Radical and incremental innovation**

The duality between radical and incremental innovation refers to the degree of change associated with the innovation, as well as the resulting impact on a firm's perceived risk and existing core competencies.

Radical innovation, also known as "competence destroyers", corresponds to discontinuous events resulted from a deliberate research and development activity, as states Freeman (1998). Another approach is the one that remarks that this kind of innovation occurs when the technological knowledge needed to exploit differs a lot in

relation to the already existent knowledge. It is probably more illustrative the definition given by Gopalakrishnan and Damanpour (1997): radical innovations are “those which produce fundamental changes in the activities of an organization or industry and represent clear departures from existing practices”. A very clear example of this is a totally novel product, service, or production system.

On the contrary, incremental innovation, also named “competence increaser”, is related to improvements due to use or experience, that is, the knowledge that is necessary to offer a product is based on the existent knowledge. It commonly adopts the form of smaller enhancements around major radical innovations. Even though it is frequently underestimated in regard to radical innovation, Freeman (1998) considers it is absolutely decisive for firm’s productivity growth. Once again, from Gopalakrishnan and Damanpour’s (1997) perspective, an incremental innovation is the one that “merely call for marginal departure from existing practices; they mainly reinforce the existing capabilities of organizations”. For instance, an example of incremental innovation is the adaptation, refinement, and enhancement of existing products, services or production and delivery systems. Hence, in contrast with the radical innovation, the incremental is only a partial change of the existing product, service or process in question.

We should mention that both radical and incremental innovations can be at the same time either product or process.

Even other authors have classified the innovation as technological or organizational/administrative. However, this categorization is irrelevant to the field of study.

With regard to the measures of innovation, there are two main levels: the organizational level or the so called political level. For our study, the really important one is the first, since the measures of innovation at the organizational level are focused on individual firms, while the political level is related to a country or region competitive advantage trough innovation.

The measures of innovation at the organizational level can be conducted whether by surveys, workshops, consultants, or internal benchmarking; as there is no established general way to measure organizational innovation nowadays.

Corporate measurements often use balanced scorecards, which include different aspects of innovation. Among the many types of metrics we can mention the following: new product revenue, spending in R&D, time to market, customer and employee perception and satisfaction, number of patents, additional sales resulting from past innovations, earning per share (EPS), number of products launched[5]. However, it should be noted that not all of them are equally accurate, and even some of them can be counterproductive.

We can divide the measures into two categories: the input and the output perspective. In the first group, we should highlight R&D expenditure. A great amount of research works from the last years used as a measure of innovation the percentage of billing that firms are investing in R&D activities (R&D spending intensity), or the R&D expenses over total sales percentage. Actually, the concept of technological innovation could be wider than the realization of R&D activities. Eusebio and Rialp (2002) consider that using this measure as the only explanatory one of the firm's technological capacity for innovation in the company could generate partial or not very exhaustive results.

Regarding the second group, the output perspective, we have three main measures, which are patents, number of innovations products, and number of innovation processes undertaken by the firm. Patents are one of the key measures used in innovation research because of the good availability and reliability of long time-series data (Filipetti, 2013). However, there are some drawbacks associated with the use of patent data in particular, since not all inventions are patented and they do not necessarily lead to a success in commercialization of a new product.

[5] According to Davila, Tony; Marc J. Epstein and Robert Shelton (2006). Making Innovation Work: How to Manage It, Measure It, and Profit from It. Upper Saddle River: Wharton School Publishing.

2.2. Theories of innovation

2.2.1. The Innovation Theory of Schumpeter

Schumpeter (1942), who is considered the “father of the innovation theory”, made a very good attempt to delimit the concept of innovation, defining it as the introduction of new elements or a new combination of elements in the production or delivery of manufactured and service products, and asserting that innovation can take the following forms:

1) Product innovation: the introduction in the market of a new product or a new kind of product.

2) Process innovation: the introduction of a new method of production in an industry.

3) Organizational innovation: a new form of organization or management.

4) Delivery innovation: a new form of distribution or the acquirement of new sources of supply.

5) Market innovation: a new form of marketing or general market behaviour, including the relationship with the state and other public entities or society’s organizations, as well as consumers.

6) Raw material innovation: use of new raw materials or intermediate products.

Therefore, innovation is not necessarily related to technology, as it can be also to market, organization etc, which means that innovation can be non-technological.

2.2.2. The Innovator's Dilemma

Clayton M. Christensen is the author of this dilemma, which has the aim to help managers, consultants, and academics in manufacturing and service businesses (either high or low tech) slowly evolving or rapidly changing environments.

Firstly, the concept of "disruptive technologies" is introduced. They are the technologies that provide different values from mainstream technologies, being initially inferior to this latter in relation to their performance on attributes valued by existing consumers. In spite of its inferior performance, a market disruption finally occurs, and the mainstream product is displaced by the new one. The two preconditions for the market disruption are performance overshoot on the focal mainstream attributes of the existing product, and asymmetric incentives between existing healthy business and potential disruptive business.

The term "disruptive technology" is subsequently replaced by "disruptive innovation" in order to widen the application of the theory, including services and business apart from technological products. The definition of disruptive innovation given by Christensen is the following[6]: "Generally, disruptive innovations were technologically straightforward, consisting of off-the-shelf components put together in a product architecture that was often simpler than prior approaches. They offered less of what customers in established markets wanted and so could rarely be initially employed there. They offered a different package of attributes valued only in emerging markets remote from, and unimportant to, the mainstream". He classified them into low-end and new-market disruptive innovations, both being created and existing in value networks, which are contexts within which companies respond profitably to the common needs of a class of customers through evaluating and establishing appropriate processes and channel partners (Christensen and Raynor, 2003).

On the one hand, low-end disruptions are the ones that take root at the low end of the original, mainstream value network, and attack the least attractive customers (the least profitable and most over-served customers, who are not willing to pay premium for enhancements in product functionality because they are satisfied with the product). Consequently, low-end disruption appears when the rate at which products improve

[6] Christensen, C. M. (2003). The innovator's dilemma: The revolutionary book that will change the way you do business (Collins Business Essentials).*Scarborough, ON: Harper Paperbacks*, p.28.

exceeds the rate at which customers can adopt the new performance. This ends up provoking, at a certain point, that the performance of the product overshoots the needs of certain customer segments. It is at this point when a disruptive technology enters the market, offering a product with lower performance than the incumbent but that exceeds the requirements of certain segments, thus getting a foothold in the market.

On the other hand, new-market disruptions create a new need in customers (due to their affordability and simplicity of ownership), that was previously unserved by existing incumbents. Therefore, this type of disruption occurs when a product fits a new or merging market segment that is not being served by existing incumbents in the industry.

To conclude, a disruptive innovation is an innovation that can hurt successful and well managed companies that are focused on their customers and have excellent R&D. The disruptive innovations help to create a new market and value network, and eventually disrupts an existing market and value network (over a few years or decades), displacing an earlier technology. The term is used in business and technology literature to describe innovations that improve a product or service in ways that the market does not expect, typically first by designing for a different set of consumers in a new market and later by lowering prices in the existing market.

The limitations of the theory have been challenged, since the methodology consisted on particular case studies as the principal form of evidence. As a consequence, it may simply be the case that some firms are lucky in their technology choices (Barney 1997). Besides, some of the companies identified as victims of disruption around a decade ago, still remain dominant in their industries today.

3. Exploring the relationship between internationalization and innovation

There is a great amount of empirical literature that focuses its attention on the relationship between (technological) innovation and internationalization. This relationship has been analyzed in several ways: the impact of innovation on internationalization (i.e., innovation as a cause of internationalization); the impact of internationalization on innovation (i.e., internationalization as a cause of innovation) and the complementarity between internationalization and innovation (i.e., innovation and internationalization in a virtuous cycle). For each of these types of the relationship we are going to explain the main theoretical justification and then we review some of the empirical literature for each case.

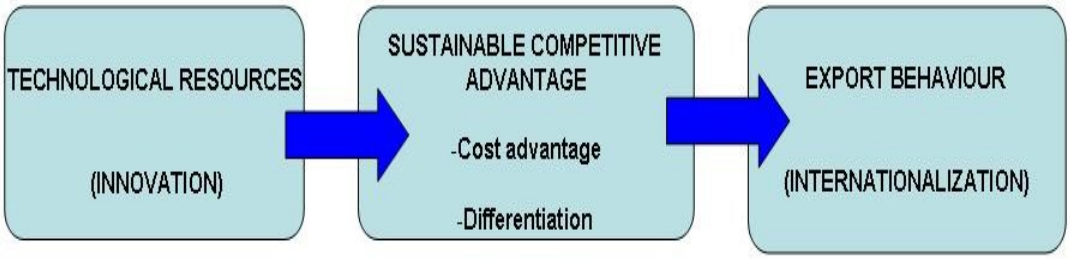
3.1. The impact of innovation on internationalization

3.1.1. Theoretical justification of the relationship: Competitive advantage

One of the main theoretical justifications for the effect of innovation on firm internationalization is through the creation of competitive advantages. Competitive advantage represents a condition or circumstance that puts a company in a favorable or superior business position over its competitors. Porter (1990) identified two basic types by which firms can gain competitive advantages: cost advantage, that is, the firm is able to deliver a product or service of similar quality as our competitor, but in a more efficient way, with a lower cost; or differentiation advantage, through which the firm is able to deliver a product or service that generates benefits that exceed those of

competing products. Thus, a competitive advantage enables the firm to create superior value for its customers and superior profit for itself. Hence, firms that achieve some competitive advantages would have a superior capacity, as they would be more competitive to enter and sell products in foreign markets. However, where do these competitive advantages come from? According to the Resource-Based View (Wernerfelt, 1984; Barney, 2001) through the possession of a particular set of resources and capabilities that do not have strategic substitutes and are inimitable or difficult to imitate for competitors. Within these resources, one of the most important are the so called intangible resources which by their very nature (based their construction on intensive knowledge) are very difficult to imitate. And one of the most important of these intangible resources are the technological resources (patents, innovations), due to their competitive potential. Technological resources can create a cost advantage through process innovations, in which firms develop new and more efficient ways of doing things or a differentiation advantage through product innovations by which firms creates a new or a superior product i.e. a product of better quality, or a higher performance, therefore favoring firm internationalization.

We represent the creation of a Competitive advantage in Figure 1:



Source: Own elaboration

3.1.2. Empirical evidence of the relationship

3.1.2.1 Barrios, Görg and Strobl (2003)

These authors analyzed the relevance of a company's own R&D activity, as well as intra-sectorial spillovers, on the decision to export and the export intensity. For that purpose, they used data from the SBS[7] during the period 1990-1998. They measured export activity in a dual way: as a dummy variable (equal to one if a company is an exporter, while equal to zero if it is not), and as the firm's export ratio (exports as a percentage of total firm's sales). In terms of R&D activity, they used to measure it the R&D intensity (ratio of R&D expenditure over total sales). They also experimented with two proxies for R&D spillovers: the R&D undertaken by multinational enterprises located in the same sector, and the R&D of domestic companies. The findings of their study show evidence of the following: on the one hand, that own R&D intensity has an important influence on whether the enterprise exports, and how much it exports. On the other hand, that R&D spillovers do not have influence on the likelihood of domestic firms becoming exporters, even if foreign companies do benefit from R&D spillovers from other multinational enterprises which operate in the same sector. Nevertheless, R&D spillovers have positive effect on a company's export ratios (not only for domestic, but also for international firms). This impact is of R&D spillovers on export intensity is larger for those enterprises which are exporters to OECD countries than for those who are non-OECD countries. They also found that firms are more likely to be exporters the larger and older they get, the more productive and more skill intensive they are, and if they belong to export oriented sectors.

[7] The SBS is the Spanish Survey on Business Strategy, which is a survey conducted annually by the SEPI Foundation consisting of a panel survey directed to industrial manufacturing companies rooted in Spain. It has its origin in an agreement signed in 1990 between the Ministry of Industry and SEPI Foundation, which was responsible for the design, control, and implementation of the survey.

3.1.2.2 López and García (2005)

In this study the influence of a firm's technological capacity on both its decision to export and its export intensity is examined, based on a sample of Spanish manufacturing firms from the SBS for the period 1998-1999 using nonlinear regression models. In their study they measured exports in a dual way: as a dichotomous variable, indicating if the firm conducts exports or not (export propensity) and as the proportion of a firm's total sales that are represented by exports (export intensity). The technological resources are measured in terms of the percentage of the total sales that the firm destines to R&D investment (R&D intensity) and also they complemented its measured with other variables such as product innovation, process innovation and patents registered by the firm. The results of their analysis show that innovations (both in product and processes) and patents positively and significantly affect the likelihood that a firm will start to export (export propensity) and on its export intensity. However, patents have not such significantly effect as product and process innovation. In relation to R&D spending intensity, they found out that it only has a positive effect on export intensity, but it is not significant in the propensity to export. A possible explanation behind this fact is that spending in R&D does not necessarily lead to innovations in either products or processes that give firms some competitive advantages to enter international markets. Nevertheless, the positive effect on export intensity is probably due to the fact that once a firm has started its exports activity, it needs to sell as much output as possible in order to recover its R&D investment.

They also found that firm size and having foreign capital in their proprietary structure have a positive and significant effect on export propensity and intensity.

3.1.2.3. Becker and Egger (2007)

In this paper a dual approach is taken in order to study the contrasting effects of new product and process innovations on export propensity at the firm level. The data selected were based on the Ifo Innovation Survey[8]. As dependent variables, the database gives the information collected about the export status of the company (whether it has exported or not) and about product and process innovation activities (if

[8] It is conducted annually by the Ifo Institute, covering more than 1000 firms in Germany each year.

it has applied new product or process innovations over the last six months or not). With regard to the independent ones, the survey asked about a set of incentives and obstacles to innovation (such as lacking own capital, lacking external capital, long amortization period, imperfect opportunities to cooperate with public or academic institutions) and other firm-level characteristics.

Their results show that product innovation is relatively more important than process innovation to rise a company's export propensity, even if both types of innovation exert an influence in the latter. There is no strong evidence that process innovation fosters a firm's propensity to export beyond product innovation. The reasons behind this are that product innovation is an important factor for successful market entry, while process innovation is more helpful to secure a firm's market position.

3.1.2.4. Yi, Wang and Kafouros (2013)

These researchers took a different perspective than the previous ones, as they take into consideration institutional factors. However, it is really interesting because they challenge the assumption that innovative capabilities are always beneficial for exporting. They conducted an analysis using a panel dataset from China manufacturing firms for the period 2005–2007. The data were extracted from the Annual Census of Chinese Industrial Firms[9] complied by the National Bureau of Statistics of China (NBS). As the dependent variable, they took export performance (share of export sales over total sales), whereas as the independent one they chose innovative capabilities (the share of new products sales in total sales). They also included four institutional variables as moderators (ownership, measured by the share of foreign capital in total assets; government relationship, by the share of state-owned assets in total assets; business group, by a dummy variable which is coded one if the firm is affiliated to a business group and zero otherwise; regional marketization, by a composite index that evaluates the development of market-based mechanisms in five key areas: government, the development of the private sector, the development of commodity and factor markets, and the development of free market institutions).
Their findings demonstrate that location-specific institutional factors (such as foreign ownership, business group affiliation, and the degree of marketization of the region

[9] The Census provides detailed firm-level financial and operational information for companies with annual turnover of over five million Renminbi (which is around $680,000).

where the firm operates) positively moderate the effects of innovative capabilities on export performance. Consequently, the relationship between innovative capabilities andexport performance is not uniform, but contingent upon the institutional context in which the firm is located.

The chart below (Chart 2) summarizes the studies analyzed, including the author and year, and giving details of the data collected, the variables used and the main results and conclusions that have been reached.

NNOVATION AS A CAUSE OF INTERNATIONALIZATION			
Author (year)	**Data**	**Variables used**	**Results and conclusions**
Barrios et al. (2003)	From SBS, Spanish manufacturing firms (1990-1998)	Dependent: Export ratio; Independent: R&D intensity	R&D intensity has an important influence on the decision to export and how much to export. R&D spillovers exert positive effects on firm's export ratios
López and García (2005)	From SBS, Spanish manufacturing firms (1998-1999)	Dependent: Export propensity and intensity; Independent: R&D intensity, completed with product innovation, process innovation and patents registered	Innovations, both in product and process, and patents positively and significantly affect the export propensity and intensity
Becker and Egger (2007)	From Ifo Innovation Survey, German manufacturing firms	Dependent: export status, product innovation, process innovation; Independent: incentives and obstacles to innovation and firm characteristics	Product innovation is relatively more important than process innovation to rise a company's export propensity
Yi et al. (2013)	From the Annual Census of Chinese Industrial Firms (National Bureau of Statistics of China), chinese manufacturing firms (2005-2007)	Dependent: export performance; Independent: innovative capabilities	Location-specific institutional factors positively moderate the effects of innovative capabilities on export performance

3.2. The impact of internationalization on innovation

3.2.1. Theoretical justification of the relationship: Learning by exporting

The effect of internationalization on innovation has been not so deeply studied by academicians as the opposite one. The most robust and significant theoretical argument that holds this relationship is the so-called "Learning by exporting" approach.

The basis of this principle is the experiential knowledge that a firm acquires when internationalizing, which is supported by the internationalization process theory (Johanson and Vahlne, 1977). From this theoretical perspective, firm internationalization is viewed as a learning and knowledge accumulation process developed through the successive stages of the process of internationalization. "Learning by exporting" is allegedly driven by information exchange from the foreign market; usually through export intermediaries or agents, or directly from customers. Consequently, enterprises that operate in international markets generate more knowledge than their counterparts that participate only in the domestic market, since the former learn much more from external sources. The fact of competing in a foreign market allows companies to achieve both market and technological information. Particularly, the latter is crucial because it is more directly related to innovation, so international firms can innovate more due to the access to this particular information. However, it should be pointed that there would be more likely and easy to transfer information about the product than the process, which is more complex. Some examples of experiential knowledge would be information about the consumer preferences with regards to the goods; the competitor's products; international practices of competitors; the manufacturing process they use etc.

We represent the "Learning by exporting" approach in Figure 2:

Source: Own elaboration

3.2.2. Empirical evidence of the relationship

3.2.2.1. Salomon and Shaver (2005)

These authors made an attempt to analyze if there are ex post benefits that increase to exporting firms by examining innovation outcomes. They employed data from the SBS for the period 1990-1997. It consist on a sample of Spanish manufacturing firms with 200 or more employees, including a random sample of 5% of the population of firms with at least 10 but fewer than 200 employees. To conduct the analysis they used product innovation counts and patent application counts as dependent variables, while exports as the independent one.

They found that exporting is related to ex post increases in two of the measures of firm innovation: product innovation and patent applications, which means that these measures increase after the exportation takes place. Hence, exports have a positive effect in both measures; we can contend that internationalization is a cause of innovation. We must note that the effect is more pronounced with further lags, for example, the following two years since the beginning of exportation. We should also highlight the differences between the two measures of innovation; the authors contend that for product innovations it is easier to gather and process consumer feedback; then adaptation of products to meet the needs of heterogeneous foreign consumer is quicker. On the contrary, it takes more time for firms to incorporate the technological knowledge received from the foreign market to realize patents.

3.2.2.2. Vila and Kuster (2007)

In this case it is analyzed the importance of innovation for companies involved in international marketing. A qualitative study was conducted using 154 leading textile firms operating in Spain. They interviewed the managers of the companies about a number of questions on the following topics: entry forms when going abroad, and innovative decisions in relation to products, strategies, processes and markets. The

sample of firms in the Spanish textile sector came from ARDAN[10] (Annual Accounts field at the Registry of Companies) database.

As a measure for internationalization, they used a classification of firms under the five following levels of internationalization: Non internationalized firms, indirect export firms, direct export firms, export agreement firms, and direct investors. Regarding innovation, they considered four metrical variables: product innovation, strategy innovation, process innovation, market innovation. Apart from these they also included another three variables: number of countries operating in, age, and number of months since last innovation.

Their results, based on four hypotheses, have given empirical evidence of the following:

1) Internationalization is not dependent on product innovation. Hence, a firm's decision to create new products is not due to its international needs. It is completely possible that a domestic company, which is not internationalized would launch more products than a multinational one.

2) Internationalization is not dependent on market innovation. Even if the firm has a more sophisticated internationalization formula, its ability to anticipate demand, respond more quickly to action by competitors and other aspects of market innovation would not necessarily increase. However, it is shown that more internationalized companies operate in a larger number of countries, while lower internationalized ones only in a few, usually geographically and culturally close.

3) Internationalization is dependent, to some extent, on strategy innovation. This can be inferred from the results, which show that domestic companies develop less innovative strategies than highly internationalized enterprises. Then, the greater the level of internationalization of an enterprise, the more innovative the strategies.

[10] ARDAN is a business information service developed by the Department of Advanced Services Consortium of the "Zona Franca" of Vigo, originated in 1993. Its primary mission is to bring the general public corporate information, support services and develop the strategic information for making business decisions that lead to improved competitiveness.

4) Process innovation depends on internationalization. This means that the greater level of internationalization, the more innovative the processes. It is obvious that the most internationalized firms, that are very well-prepared after having gained access to foreign markets, will become innovative in their productive processes (for example, superior marketing activity or superior technologies).

In summation, this research provides partial support for the argument that international expansion influences some types of innovation, particularly strategy and process. In other words, the strategy of a firm and its processes depend on its international commitment (its level of internationalization). The reason for this is that, as the firms internationalize, they need to continually search for new strategies and processes to understand better the new foreign countries in which they are focusing their efforts and activities.

The results show that companies do not really differ significantly in their age or in the number of months elapsed since last innovation. We can contend that neither the number of years that the enterprise has been operating nor the fact that the last innovation has taken place recently are determinant factors. The explanation behind this could be the nature of the textile sector, which is mature and highly competitive. Nonetheless, the limitations of this study should be remarked, since it is focused only in the textile sector, and there may be variations in the results if extrapolated to other sectors.

3.2.2.3 Bratti and Felice (2011)

In their study, these authors analyzed the impact of exports on the likelihood of introducing product innovation in particular. For the empirical analysis they took data from Italian manufacturing firms of two waves, 1998-2000 and 2001-2003, from SIMF[11]. They focused on exporting, as independent variable, as it is the most common way of

[11] SIMF is the Survey on Italian Manufacturing Firms managed by the UniCredit banking group. The survey is representative of the population of Italian Manufacturing firms with more than 10 employees, and collects information on a sample of manufacturing firms with 11-500 employees and on all firms with more than 500 employees.

internationalization (they took a dummy variable that takes value one if the company is a exporter or value zero if it is not). Regarding the dependent variable, they focused on a direct measure of product innovation, which is the company's likelihood of introducing a new or improved product (It is a dichotomous indicator that takes value one if a product innovation has been taken during the period in question, that is if it has been introduced a completely new product or an important improvement of an old one, or zero otherwise).

Among their results, they found the following evidences: there is a statistically significant correlation between exporting and introducing product innovations, even after controlling for many company's characteristics that may be a possible influence onit. They conclude that mentioned effect of exports on product innovation is not due to size or higher investments in R&D (as they also used mediating variables in their econometric analysis). However, they stated that the effect is probably generated by heterogeneity in foreign customer's tastes and needs, that is, depending on how the interaction between exporters and foreign customers is, and particularly the need of a domestic company to modify its product when accessing a foreign market.

3.2.2.4. Altomonte, Aquilante, Békés and Ottaviano (2013)

The study consists on determining how companies that are internationalized in different forms are actually innovating. With that aim, they focused on a dataset extracted from the EU-EFIGE/Bruegel-UniCredit[12], consisting on a representative and cross-country comparable sample of European manufacturing firms from seven countries belonging to the European Union for the year 2008. The selected dataset permits to go beyond the standard dichotomy of exporters versus non-exporters, and makes a distinction between international inactive companies and a variety of different levels of international active firms.

[12] It is an EU-funded project whose initials correspond to 'European firms in a global economy'. It was led by Bruegel, and it received the support of the Directorate General Research of the European Commission. It examines different aspects of European firms, such as their internationalization and other related policies, size, productivity, type of ownership, employment and innovation. EFIGE combined the latest theoretical and empirical research through a cross-country survey, and it also produced reports for Germany, Spain, France, Italy, Hungary, Austria and the United Kingdom. In summation, the project consists on an assessment of the internationalisation patterns of European firms.

Regarding the international activities, they classified them into five categories: exporter, importer, FDI maker, outsource, outsourcer, foreign owned. This implies that not only exports are being considered, just as was the case of other studies. Therefore, they measured internationalization intensity as the number of internationalization modes in which a firm is simultaneously involved (ranging them between 0 and 6, from exporter to foreign owned). In relation to innovation, they classify companies into the three following modes: R&D maker, process innovator and product innovator. Hence, they measured innovation intensity as the number of innovation-related activity modes in which the firm is simultaneously involved. Some examples of innovation activities are the innovative effort yielding a patent, a design, a trademark or a copyright; the sources of R&D the firm has tapped; and IT (Information Technology) projects.

Their findings suggest that there is a strong positive correlation between internationalization and innovation at the firm level. They show that the greater the complexity of the internationalization mode adopted, the stronger the correlation is (that is, it is stronger for outsourcers and FDI makers than for importers, outsourcees and exporters). Although at lower levels of internationalization the correlation is weaker, it is still significant. As a consequence, active international firms are not only the largest and most productive enterprises, but also the smaller and less productive companies, whose activities in foreign markets are carried out through a relatively simple form of internationalization and innovation. They also found an association of simple internationalization with the dyads export-innovation or import-innovation, and complex internationalization with the triad export- import – innovation.
They came to a final conclusion, which is that internationalization and innovation policies should be better coordinated at national and European levels.

The chart below (Chart 3) summarizes the studies analyzed, including the author and year, and giving details of the data collected, the variables used and the main results and conclusions that have been reached.

INTERNATIONALIZATION AS A CAUSE OF INNOVATION			
Author (year)	**Data**	**Variables used**	**Results and conclusions**
Salomon and Shaver (2005)	From SBS, Spanish manufacturing firms (1990-1997)	Dependent: Product innovation, patent application; Independent: Export volume	Exporting is related to innovation (to ex post increases in product innovation and patent applications)
Vila and Kuster (2007)	From ARDAN database, Spanish textile firms	Dependent: product innovation, process innovation, strategy innovation, market innovation; Independent: 5 levels of internationalization	Internationalization is neither dependent on product innovation nor on market innovation; but it is dependent on strategy innovation. Process innovation is dependent on internationalization
Bratti and Felice (2011)	From SIMF, Italian manufacturing firms (two waves: 1998-2000 and 2001-2003)	Dependent: product innovation (dichotomous variable) Independent: exports (dummy variable)	Exports have a positive influence on the likelihood of introducing product innovations. This effect is not due to size or higher investments in R&D, but to the heterogeneity in foreign customer's tastes and needs
Aquilano et. al (2013)	From EU-EFIGE/Bruegel-UniCredit, manufacturing firms from 7 European Union countries (2008)	Dependent: Internationalization intensity; Independent: Innovation intensity	There is a strong and positive correlation between internationalization and innovation. The greater the complexity of the internationalization mode adopted, the stronger the correlation is

3.3. Innovation and internationalization in a reciprocal relationship

3.3.1. Theoretical justification of the relationship: Complementarity

This third perspective of the relationship has begun to be examined recently; it has not been so deeply studied as the two other directions until the last few years.

The essential theoretical argumentation for supporting the reciprocal relationship has its basis, on the one hand, in the fact that more innovative firms can better compete and thus become more internationalized. On the other hand, internationalized firms are exposed to a diversity of cultures an innovation environment from which they can learn and access to new information or knowledge. Then, the benefits that come from innovation depend on firm's learning abilities, and these abilities, may increase precisely through exports (we should refer here to the already explained "Learning by exporting" approach[13]).

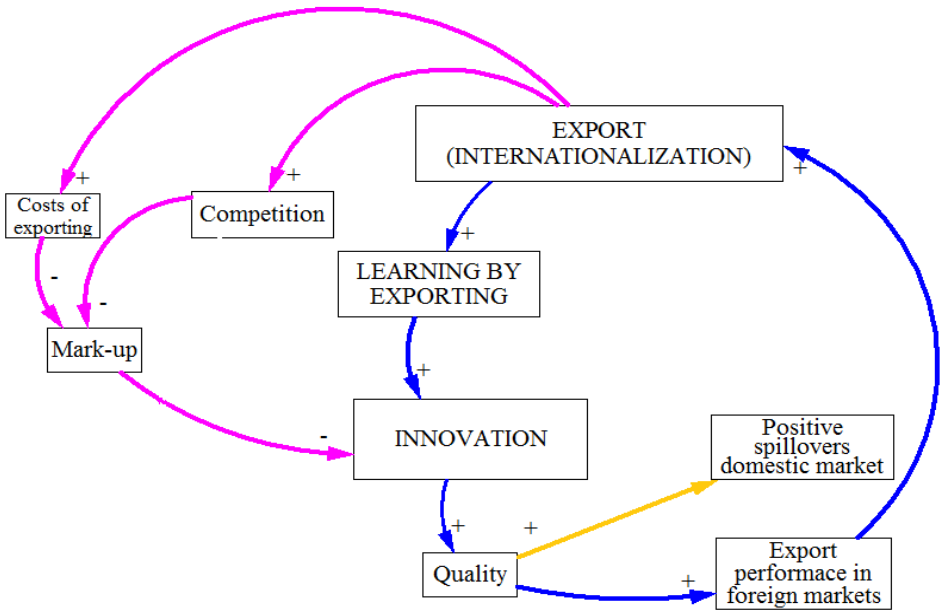
We are going to explain it more thoroughly: exporting firms that also innovate can further increase their sales growth by selling better products (of improved quality) not only in domestic markets, but also in exports markets. Exportation in foreign markets is a fundamental channel for firms to boost their sales, both for already established companies and young or small enterprises (Shrader, Oviatt and McDougall, 2000). Nevertheless, sales growth depends on the quantity sold abroad and, of course, on the price charged in the foreign market. Generally, foreign markets generate lower mark-ups in comparison with domestic markets, due to more competition and the costs derived from exporting. Likewise, the difference between export and domestic pricing is due to differences in prices across firms in the same product markets, which together with within-market variations reflects also differences in product attributes and quality. The differences in quality are explained by investments in innovation, which also enable companies to achieve greater capability to meet the demands of both the domestic and foreign markets. (Zahra and Covin, 1994). The key factor is that the improvement of products (such as unique features or differentiation), achieved through

13 Vide Section 3.2.1. Theoretical justificationof the relationship: Learning by exporting.

innovation, increases export performance in the foreign market, and, at the same time, generates positive spillovers in the domestic market.

In summation, the argument suggests that when innovating firms access international markets, they have the opportunity to learn by exporting and, as a consequence, produce higher-quality innovations. This will lead them to gain an even higher market power in domestic and foreign markets, and, consequently, increase their sales. At the same time, the better performance in foreign markets will reinforce the exports activity.

In conclusion, it is expected a positive complementarity between exports and innovation, meaning that these activities reinforce each other. The explanation can be schematized in the following causal diagram (Figure 3), representative of the virtuous circle or reinforcing process (in blue):



Source: Own elaboration

3.3.2. Empirical evidence of the relationship

3.3.2.1 Filipescu (2011)

The purpose of this paper is to demonstrate the relationship between internationalization and innovation in the three possible directions. They used data from the SBS, focusing on an unbalanced panel (since some firms cease to provide information) of comprising 696 firms during the period 1994-2005; of these firms, about 65% were exporters and around 44% were innovators. They took as dependent variable the foreign commercial activities, focusing on three variables that explain exports: number of main international markets (those that represent at least 50% of firm's total sales), propensity to export (ratio between exports and total sales), and the exports value (export intensity). Regarding the independent variables, they took firm's technological activities: Innovative intensity (ratio between R&D expenses and total sales), number of product innovations, and process innovation. The forth independent variable focus on firm's experiential knowledge (firm age). For the second part of their analysis they reverse the direction, taking the dependent variables as independent and vice versa, in order to determine both the effect that technological innovations have upon exports and the influence of the latter on the former. One year lagged variables regarding technological innovations and exports are also introduced just for the independent variables.

The results, on the one hand, show that the first direction of the relation is met, that is, innovation exerts influence on internationalization, since technological activities are an important factor in a company's international performance, providing it with greater capacity to access foreign markets and sell products there. If a company wants to increase its sales abroad (export intensity) or its propensity to export, it has to consider the process innovations developed a year before, but not the product ones. The reason behind this is that enterprises which develop process innovations are more interested in maintaining their international market position than having successful market entries (Becker and Egger, 2007).

On the other hand, the second direction of the relation is also proved; internationalization influences the advances achieved in technological innovations. The higher the number of main international markets in which a firm exerts its activity, the

more product innovations developed. This is because the firm gains access not only to new market knowledge of the export market but also to different patterns of consumer behaviour. Nonetheless, there is no effect of internationalization neither on innovative intensity nor on process innovation advances. This could be because product innovation is probably handier and there is less need of R&D investments. Moreover, it is crucial how much a company sold in foreign markets in previous years in order to achieve more technological innovations in the current year. Consequently, when a firm is consolidated abroad, (with a relevant value of export sales), it develops both product and process innovations, with a high R&D investment.

Finally, with regard to the mutual relation, there is evidence on its existence. Companies innovate (investing in R&D) in order to gain sustainable competitive advantages that allow them to compete in international markets; at the same time, international production favors the entrance to foreign knowledge, enhancing innovation. Once again, the Resource-based view and the “Learning by exporting” perspectives are considered.

3.3.2.2. Golovko and Valentini (2011)

These authors tried to verify that innovation and exportation are complementary strategies for SME's growth. In order to do that, they analyzed an unbalanced panel of about 1400 Spanish SME’s over a period of ten years, from 1990-1999. The data they used in the study came from the SBS, containing firms belonging to different industries. They created for each firm-year observation four exclusive dummy variables that indicate firm strategy with regard to its export and innovation activities, distinguishing the following cases: firms that both export and innovate, firms that only export, firms that only innovate, and firms that neither export nor innovate. To prove the complementarity between innovation and exports they followed the test of complementarity proposed by Cassiman and Veuglers (2006).

In their findings they came to the conclusion that the purported complementarity does exist. They considered the relationship between internationalization and innovation as a virtuous circle, which in the field of strategic management means a reinforcing process.

They show that *ceteris paribus*, the positive effect of innovation on firm's growth rate is higher for companies that also engage in exports, and vice versa. Moreover, when a company adopts a growth strategy, such as exportation, it positively influences the adoption of the other strategy, innovation.

Besides, they include an explanation on what promotes that complementary nature. Arguably, there are two conditions to be met for the functioning of the aforementioned virtuous circle. First, enterprises need to be able to identify and absorb the valuable external information accessible in foreign markets. Second, the knowledge absorbed in export markets has to be effectively used and incorporated in innovations, and the value of these innovations should be recognized and valued in both domestic and international markets. These two conditions are in accordance with the "Learning by exporting" approach.

3.3.2.3. Chiva Ghauri and Alegre (2013)

This study contributes to the literature review on the relationship between internationalization and innovation from a different perspective. These phenomena have been traditionally linked through linear causality, that is, by considering one of them as the cause of another[14]. However, in this study the mutual causality is analyzed, as the authors consider the linear causality to be inconsistent, since while some studies find that internationalization (the cause) affects innovation (the effect), others conclude the opposite. Moreover, the linear approach is static; hence it does not allow understanding the dynamics of that relationship. For this reason, the authors provide a dynamic view of the relationship between internationalization and innovation, adding the concept of organizational learning and analyzing the way in which each one of them relates to the other.

In order to clarify the relationships between organizational learning, innovation and internationalization, two Spanish clothing companies are chosen, considering the degree of internationalization and their innovation approach (process versus product), growth evolution and market strategy. The data were collected during 2009-2011 from

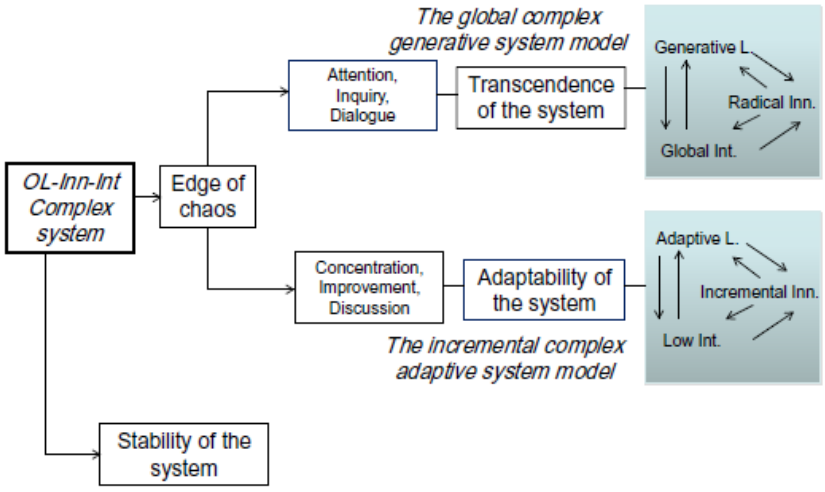
[14] As we have observed in the sections: *3.1.The impact of innovation on internationalization* and *3.2.The impact of internationalization on innovation.*

documents and through semi-structured, in-depth interviews with managers with at least two years' experience in the firm. The technique adopted was the pattern-matching, in which the patterns observed in practice (in the data) are matched with patterns derived from already existing theory.

The conclusion reached by the author is that the three concepts constitute a complex system, and that any alteration can take the system to the edge of chaos (or limited instability). After the alteration, the system might either adapt (by concentration, discussion and improvement) or transcend (through attention and dialogue).

The authors associate specific types of learning with types of innovation and internationalization. The different paces of the two case study companies led their systems to two different models. Firstly, the incremental complex adaptive system model, which is defined by adaptive learning, incremental innovation and low internationalization (when a company experiences adaptive learning). Secondly, the global complex generative system model, whose main features are generative learning, radical innovation, and global internationalization. In other words, when a firm experiences adaptive learning (to adjust to changes in the environment) it usually adopts incremental innovation and low internationalization strategies, whereas a firm that takes the generative learning (based on a modification in the core organizational characteristics), tends to experience radical innovation and global internationalization.

The following figure (Figure 4) is a very illustrative schematic explanation of the Complex system model:



Source: Chiva, R., Ghauri, P., & Alegre, J. (2013). *Organizational Learning, Innovation and Internationalization: A Complex System Model*. British Journal of Management.

3.3.2.4. Halilem Amara and Landry (2014)

In this paper the total, direct and reciprocal effects between internationalization and innovation are considered by using a nonrecursive structural model. The data used are collected by a CATI (computer-assisted telephone interview), including 1156 firms of 250 employees or less for the period 2002-2003.

The model consisted on an endogenous model composed of all the dependent variables[15] (innovation is defined through product and process innovation, whereas internationalization is defined through both inward and outward internationalization in closer and farther markets), and of an exogenous one, with the independent variables (considering firm age and size; public financial and technical support; and use of advanced technologies).

The findings of the study revealed, once again, the form of a virtuous circle or reinforcing process. However, this time the virtuous circle is between the forms of internationalization: importing from a closer market fosters both importations from farther markets and exportation to the mentioned closer market; importing from farther markets fosters exportation to farther markets; and exporting to a closer market fosters exportation to farther markets. Regarding the other direction of the relationship between internationalization and innovation, they found that product innovation is important for outward internationalization (exports), but process innovation could be detrimental to it.

[15] They separate into dependent and independent variables, even if they also influence each other.

The chart below (Chart 4) summarizes the studies analyzed, including the author and year, and giving details of the data collected, the variables used and the main results and conclusions that have been reached.

COMPLEMENTARITY BETWEEN INTERNATIONALIZATION AND INNOVATION			
Author (year)	**Data**	**Variables used**	**Results and conclusions**
Filipescu (2011)	From the SBS, both exporters and innovators (1994-2005)	Dependent (independent): number of international markets, export propensity, export intensity; Independent (dependent): Innovative intensity, number of product innovations, process innovation	Technological innovations in process have a positive impact on exports; exports have a positive effect on product and process innovation; a two-way link does exist between internationalization and innovation
Golovko and Valentini (2011)	From the SBS, Spanish SME's firms from different sectors (1990-1999)	Dummy variables: export and innovative firms, firms that only export, firms that only innovate, firms that neither export nor innovate	Innovation and export positively reinforce each other in a dynamic virtuous circle. Positive effect of innovation activity on firm's growth rate is higher for firms that also engage in exports and vice versa
Chiva et al. (2013)	From semi-structured and in-depth interviews, Spanish clothing companies (2009-2011)	Variables are not used: pattern-matching technique between patterns observed in practice (in the data) and in theory	There are two complex systems: incremental complex adaptive system model (adaptive learning, incremental innovation and low internationalization) and the global complex generative system model (generative learning, radical innovation and global internationalization)
Halilem et al. (2014)	From CATI, SME's firms in Canada (2002-2003)	Dependent : product and process innovation, inward and outward internationalization; Independent: firm age, size, public financial and technical support and use of advanced technologies	There is a virtuous circle between the forms of internationalization. Product innovation influences outward internationalization, but process innovation could be detrimental to it

Conclusions

As we have examined, internationalization is a natural phenomenon in firms, since it is intrinsically linked to their evolution. Although the numerous definitions of the concept, what really matters is to point out that it does not only involves outward operations of firms (from the domestic to the foreign market), but also inward operations, such as imports (as sometimes companies that only import are not seen as international).

Regarding the theories of internationalization, among the ones from an economic perspective, we should highlight Dunning's Eclectic Paradigm, in which it is concluded that FDI is the best way for a company to become a MNE. In contrast to this theory, in practice we observe that exporting is the prevalent mode of international expansion (as it is the easiest and cheapest one). In relation to the organizational perspective, internationalization can be seen, on the one hand, as a gradual process, in which there is an increase in the degree of involvement in the international operations of a firm, by subsequent stages (The Uppsala Model); or, on the other hand, as a phenomenon that takes place from the inception of a company (The Born Global Theory). However, we should note that usually companies are gradually internationalized rather than being global from their inception.

Innovation has proved to be really important at the firm-level, since it is one of the best alternatives to compete in the new context of global capitalism by generating a competitive advantage. The idea behind the concept of innovation is basically the introduction of newness, although there is a wide range of definitions around the concept. The term has to be differentiated from that of technology, although on numerous occasions they have been treated equally. Indeed, most of the innovations are technological. Nevertheless, apart from them, there are other types. The OECD made a distinction into four categories: product, process, marketing, and organizational innovations. These four types coincide with some of the ones defined by Schumpeter (1942). Another perspective is the one adopted by Propris (2002), who divided the innovation into radical/incremental, depending on the degree of change introduced.

After carrying out a literature review of diverse studies about the relationship between internationalization and innovation, we can contend that there is enough evidence to prove the existence of the purported relationship. Even though there are certain studies that did not find evidence on the relationship, or others that found a non-significant one in certain aspects, as we will verify in the three following sections (each corresponding to one of the three possible directions of the relationship between the two phenomena):

1) The impact of innovation on internationalization

In all the studies of this section it has been shown that innovation (in its various forms) has an effect on internationalization. Summarizing, R&D intensity (Barrios, Görg and Strobl, 2003) and both product and process innovations (López and García,2005) have an important influence on a firm's decision to export and how much it exports, that is, on export propensity and intensity. Among the types of innovation, product and process, the former seems to be more relevant than the latter for raising a firm's export propensity (Becker and Egger), as product innovation is an important factor for a successful market entry. Nevertheless, Yi and Kafouros (2013) contend that innovative capabilities are not always beneficial for exporting, since it depends on location-specific institutional factors (such as foreign ownership, business group affiliation, and the degree of marketization of the region where the firm operates).

Based on the results of these studies, we can conclude that the impact of innovation on internationalization is clear, so the theoretical justification through the competitive advantage is corroborated. That is, innovations lead to technological resources that create either a cost advantage through process innovations (companies develop new and more efficient way of producing) or a differentiation advantage through product innovations (firms create a new or a superior product), hence the internationalization of the firm is favored and enhanced (precisely because of the mentioned advantage). However, it seems to be more robust in some kinds of innovations (product innovations), and institutional factors may also have an influence on it.

We have verified the relationship from two of the three main relevant perspectives of the international business strategy (from the Resource-based view and from the Institution-based view), but not from the Industry-based view, as the chosen scientific studies that have been analyzed could be classified under the three following groups:

- Industry-based view: It suggests that conditions within a particular industry are the ones that determine strategy. In this case, all of the studies are focused on the same industry, the manufacturing industry, which is part of the activity of the secondary sector (that consists in transforming raw materials into intermediate products, or terminated for distribution and consumption). We should have studied the relationship in other industries to determine if the effect of innovation on internationalization is certainly verified in every industry (if it is innovation what determines the strategy of internationalization or if, in the contrary, the strategy of internationalization actually depends on the industry in which the company is located, meaning that it may be verified only in some kind of industries).

- Resource-based view: It argues that firm-specific differences determine strategy. We have verified this perspective: the competitive advantage generated by innovation is what determines internationalization. López and Rodríguez (2005) study can be classified in this group.

- Institution-based view: It states that the two aforementioned views (industry-based and resource-based) need to be complemented with relevant societal differences. Indeed, the study of Yi, Wang and Kafouros (2013) suggest that location-specific factors influence for the verification of the relationship. Likewise, Barrios, Görg and Strobl (2003**)** find the impact of R&D spillovers on export intensity to be larger for those enterprises which are exporters to OECD countries than for those who are non-OECD countries. Therefore, societal differences are proved to be influential.

In contrast to the studies analyzed during the development of this project, in which a clear relationship between innovation and internationalization is tested, there are others in which such evidence has not been found. A relevant controversial finding on the relationship is the non-significant impact of R&D on export intensity, such in studies as the one of Lefebvre and Lefebvre (1998) and Becchetti and Rosi (1998). However, leaving these exceptions apart, the previous research is quite consistent in supporting the impact that innovation has on internationalization.

2) The impact of internationalization on innovation

First of all, Salomon and Shaver (2005) results are consistent with “Learning by exporting” approach, since it is verified that exports lead to an *ex post* increase in innovation (both in product and process). Nevertheless, it could be possible that events missing from their empirical analysis (omitted variables), that take place simultaneously with exporting, are the ones that actually lead to innovation. Consequently, it cannot be categorically state that their findings are, de facto, a result of learning.

Bratti and Felice (2011) analysis could be seen as complementary of other studies, because they focus on different measures of innovation (a firm's likelihood of introducing a new or an improved product instead of R&D or process innovation).They conclude that the effect of exports on product innovation is not due only to higher investments in R&D, but that it is probably generated by heterogeneity in foreign customer's tastes and needs. This study would be also consistent with “Learning by exporting”, as firms acquired market information from the foreign market, through customers; hence enterprises that operate in international markets generate more knowledge than their counterparts that participate only in the domestic market.

Despite the limitations of Vila and Kuster (2007) study, and the fact that they found only partial support for the argument that internationalization exert influence on innovation (the influence is only found with regard to some kinds of innovation: strategy and product particularly), it is very interesting because it shows the different types of innovations according to the classification of the OECD. They show that the greater the complexity of the internationalization mode adopted, the stronger the correlation is. Altomonte, Aquilante, Békés and Ottaviano (2013) analysis also found a strong and positive correlation between internationalization and innovation that depends on the complexity of the internationalization mode adopted (the more complex it is, the stronger the correlation is). Their analysis is very useful as they used a cross-country comparable sample of manufacturing firms from seven countries belonging to the European Union, therefore the relationship is corroborated not only in one country, but in general. Once again, the evidence of the “Learning by exporting” approach is verified.

Nevertheless, some scholars have found non-significant impact of internationalization on innovation, such as Schubert and Simar (2011)[16], or Woerter and Roper (2010)[17].

We can conclude that "Learning by exporting" approach is confirmed: Innovation is fostered through the knowledge acquired abroad by participating in export markets, especially through technological information. This learning can be regarded as an input that companies can use to carry out innovation, both in process and product. As we have seen, empirical evidence of several authors (based on different samples) have found both positive and negative evidence of the relationship, then we can conclude that "Learning by exporting" theory is apparently very case-sensitive. Another relevant aspect to bear in mind is that the authors studied did not explicitly investigate variance across industries (three of them focused on manufacturing firms and the other one in textile sector), and learning by exporting may not be uniform across industries or sectors.

3) Innovation and internationalization in a reciprocal relation

Filipescu (2011) found evidence of the mutual relationship. Companies innovate (investing in R&D) in order to gain sustainable competitive advantages that allow them to compete in international markets; at the same time, international production favors the entrance to information of foreign markets, enhancing innovation. Once again, the Resource-based view and the "Learning by exporting" perspectives are verified.

The study of Golovko and Valentini (2011) showed that innovation and exportation are complementary strategies for SME's growth. The authors consider the complementarity as a virtuous circle between both phenomena, which means that it is a reinforcing process. However, some limitations are found: the results may not strictly apply to other countries, and it has been previously and empirically demonstrated by Barrios, Görg and Strobl (2003**)** that there are additional benefits of exporting to more develop countries (that of the OECD). Despite the limitations, Golovko and Valentini (2011)

[18] The findings of this study of mechanical engineering firms in Germany show that there is no significant evidence that innovations activities lead to an increase in the ability to serve the global marketing.

[19] The authors studied manufacturing firms in Ireland and Switzerland comparatively, considering the influence of both home and export market demand in innovation. Their results show little evidence of any significant export market demand effects on innovation. Instead, innovation performance is determined largely by firm-level capability effects and characteristics.

study contributes with novel evidence on the drivers of SME's growth. Halilem, Amara and Landry (2014) also defend the existence of a virtuous circle, but this time between the forms of internationalization (therefore, their study contributes to the literature of internationalization, by adding the perspective of inward internationalization, with imports). However, Chiva, Ghauri and Alegre (2013) did not find such a virtuous circle, as they adopted a dynamic point of view, rejecting linear causality for considering it inconsistent.

We can conclude that among the various findings of the mutual relationship, the one that adjusts better to the theoretical justification that we have given for the complementarity between both phenomenons is the virtuos circle of Golovko and Valentini (2001). The theoretical argument is proved empirically in their study, since innovating companies that enter international markets have the opportunity to learn by exporting and, as a consequence, produce higher-quality innovations. And, at the same time, innovation would permit a better export performance in both domestic and foreign markets, and thus the latter will reinforce the exports activity.

As a final conclusion, we can contend that the existence of the relationship at the firm-level is evident in the three directions. We can also asseverate that innovative firms are more likely to internationalize (due to the competitive advantage generated when innovating), as well as the most internationalized companies have more opportunities to innovate (due in a large extent to "Leaning by exporting"). Nonetheless, it should be highlighted that there may be variations on the relationship depending on the particular case of the firm, hence the relationship does not necessarily need to be met (either because of the type of industry and country in which it operates, of its size, age, degree of internationalization, societal influential factors, or the type of innovation carried out: process, product, market etc.).

Finally, regarding the limitations of the literature review carried out in this Final Degree Project, we can point out that only twelve studies were analyzed, four of them for each one of the three possible directions of the relationship between internationalization and innovation (the impact of internationalization on innovation and vice versa, and their mutual relationship or reciprocity). Although the research works were rigorously selected, trying to cover all the possible different points of view of the field of study, it may have remained some influential factor of the relationship without being analyzed.

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