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The contribution of the PLM to firms internationalization

A case in the footwear industry.

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Author Biographies

Simona D’Amico: Master degree in Economics and Business and Ph.D in Business Management at University of Foggia, where she has been lecturer of Fashion Management and Business Organization. In 2003 her graduation thesis on the goldsmith industry won two awards, sponsored by the “Comitato Leonardo-Italian Quality Committee” and the “Associazione Industriali di Vicenza”, respectively. In 2009 she was awarded with the research award sponsored by the “Comitato Leonardo-Italian Quality Committee” for a research dealing with strategic management issues in Italian luxury industry. From 2004 to 2010 she has been an instructor of undergraduate management courses at the University of Foggia, and from 2010 to date at Luiss Guido Carli. She is currently lecturer in several master and management training courses. Her main research interests are strategic management in fashion and luxury industries, organization design, family business and SMEs.

Luca Giustiniano: Master Degree in Economics and Management with honors and PhD in Management Information Systems at Luiss Guido Carli, where he is Associate Professor of Business Organization. Previously, he has been assistant professor of Organization Design and Organizational Behavior at the universities of L’Aquila (Italy) and Chieti-Pescara (Italy), as well as lecturer in many Italian and European universities and business schools. During his career he has been visiting scholar at the Viktoria Institute (Sweden, 1999), visiting scholar at the Wharton School of Management - University of Pennsylvania (USA, 2003) and Visiting Associate Professor at the Sauder School of Business – University of British Columbia (Canada, 2011). His main research interests include strategy execution, organization design, and implementation and dynamics of outsourcing.

Maria Elena Nenni: Master degree with honour in Industrial Engineering and Ph.D in “Tecnologie dei materiali e Impianti Industriali”. From 2004 to date she is assistant professor at University of Naples where she teaches Industrial Plant, Operations Management and Project Management. She is also lecturer in several master and management training courses (Project Management, Operations and Project Management in Luiss Business School, Operations management at STOÀ, Project

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Luca Pirolo: Master Degree in Economics and Management with honors and PhD in Business and Corporate Strategy. From 2009 to date he is assistant professor in Management at LUISS Guido Carli University in Rome, where he teaches Corporate and Business Strategies and Strategic Consultancy. He is also Director of LUISS Creative Business Center – an academic center developed to delivery education programs and researches on the creative industries (fashion, visual arts, music, cinema, and television). His main research interests include organization in creative industries, social and relational capital, outsourcing decisions.

Structured Abstract

As the globalization of markets in the footwear industry became more evident, several restrictions have been imposed by international directives, standards and regulations, and market requirements. Such external needs are progressively pushing the footwear manufacturers to introduce continuous improvements in their production processes and in general in the firm management.

This working paper represents the first step of a research with the aim of evaluating the impact of PLM on a firm internationalization in the fashion industry. The investigation is at the level of PLM as a business strategy as well as set of technical tools. The research approach mainly includes a survey on footwear industries located in the district of the “Riviera del Brenta” of the Veneto Region in Italy.

Keywords

PLM, footwear industry, technical regulations.

Introduction

As the globalization of markets in the footwear industry became more evident, several restrictions have been imposed by international directives, standards and regulations, and market requirements. Such restrictions have mostly regarded the presence of a number of chemical substances in leather and footwear, as well as physical and mechanical characteristics of soles and heels.

The most part of technical regulations come from EC directives: 1907/2006/EC, 2002/231/EEC, 2004/21/EC and the more recent European Footwear Eco-Label scheme as a marketing and publicity tool for environmental-friendly shoes.

Such external needs for regulatory compliance are progressively pushing the footwear manufacturers to introduce continuous improvements in their production processes in order to reduce or eliminate pollutants and hazardous substances as a result of their operations. Such pressures are becoming more and more mandatory for producers that are involved in exports. Otherwise some companies are not organized and/or capitalized enough to meet all the requirements. This tends to create two different industries, just like two different domains: the domain of the exporting companies (international players), and the domain of the companies that only meet the demand of the domestic market (local players). In general, the latter is made of small-sized enterprises (SMEs) that use traditional technology, this way barely meeting the requirements of the local regulations or being completely invisible to environmental agencies.

Many authors and companies recognize Product Lifecycle Management (PLM) practices as a useful system to integrate environmental activities as strategic initiatives into a business strategy. Our work tries to deepen and complete what has already been produced (see D'Amico *et al.*, 2013; Pirolo *et al.*, 2013; Nenni, *et al.*, 2013) by exploring some additional sub-field. In particular, the research question that we are pursuing is the following: **what are the impacts of implementing PLM on the companies' capability to meet requirements imposed for the internationalization?**

Based on this question, two following objectives were designed to guide the research: (i) to analyze and discuss to what extent the PLM can effectively be considered a support for internationalization; and (ii) to assess qualitatively the way in which PLM impacts.

Technical regulation/International standards

The legislation on the quality and safety footwear includes two main categories of standards:

- standards about use of hazardous substances;
- standards about general product safety and the consumer protection.

In addition to quality standards, linked to national and international standards, there may be voluntary ones, such as technical standards, Eco-Labels and private labels.

The most part of technical regulations come from EC:

- **1907/2006/EC REACH:** is the chemical legislation of the EU that came into force on 1st June 2007. It was created in order to know and master the chemicals used and produced in Europe, to evaluate them and/or eventually

decrease their uses. The main aims of REACH are to ensure a high level of protection of human health and the environment from the risks that can be posed by chemicals, the promotion of alternative test methods, the free circulation of substances on the internal market and enhancing competitiveness and innovation. REACH makes industry responsible for assessing and managing the risks posed by chemicals and providing appropriate safety information to their users. In parallel, the European Union can take additional measures on highly dangerous substances, where there is a need for complementing action at EU level;

- **2002/231/EEC**: establishing the criteria for the award of the Community eco-label to footwear. These criteria aim in particular to restrict the levels of toxic residues and emissions of volatile organic compounds, and promoting a more durable product. The criteria are set at levels that promote the labeling of footwear which has a lower environmental impact;
- **2004/21/EC**: its purpose is to protect the health of the population, limiting the insertion of finished goods in the European market of textile and/or leather in any parts dyed with azo dyes; the major concern is that a person under a prolonged exposure to these substances may become susceptible to cancer. According to this policy, by reductive cleavage of one or more azo groups, the dyes may release one or more of aromatic amines, detectable at concentrations above 30 ppm as the test methods set forth.

Among the voluntary standards we can include the following ones:

- technical standards **UNI 10594:2010**: this guidelines specifies the general requirements and the characteristics (with the relevant test methods) for the evaluation of leather (upper, sole, lining, welt, mid-sole and in-sole) for footwear industry;
- **European Eco-Label**: represents one of the possible ways which offer a valid tool for producer and consumer with the aim to promote a sustainable development and at the same time to have a responsible use of environmental friendly goods. It is clear that the Eco-Label is a condition of excellence on the market because the certification is a strong voluntary choice for a firm because the Eco-Label certification is not only a label, it is a new industrial approach. The ecological criteria for footwear are in some cases process related (i.e. emissions from the production of material, use of Volatile Organic Compounds during final assembly). In other cases they are related to the use of certain materials or substances and in other cases they are related to the final product. These criteria aim in particular at limiting the levels of toxic residues and the emissions of volatile organic compounds, and at promoting a more durable product. Appropriate test ensure that the product is conform to fitness for use;
- **OEKO-TEX STANDARD 100 Label**: is an independent test and certification system for textile raw, intermediate and end products at all stages of processing. Examples of articles that can be certified: yarns, fabrics, treated fabrics, manufactured articles (clothing of all kinds, domestic and household textiles, bedding, towels, soft toys and many more).The tests for harmful substances cover: legally banned and controlled substances; chemicals known to be harmful to the health (but not yet legally controlled);

parameters for health protection. Taken in their entirety, the requirements go far beyond existing national legislation;

- **SG® Label:** responsible manufacturers and retailers of shoes, leather goods, leather clothing and the materials required for production, know about the above mentioned risk to human health and act accordingly.

To document that their products have been manufactured with exceptional care, they label them with the SG mark which verifies that the goods have been “tested for harmful substances”. This mark is awarded to those products only which meet the stringent limit values and parameters for harmful substances set forth in the SG catalogue of test criteria. All SG limits are in general much lower than the statutory specifications. The SG mark confirms that there is no danger to health according to present-day knowledge. And this gives the consumer confidence with regard to the product’s safety.

Product Lifecycle Management in the fashion industry

The Product Lifecycle Management (PLM) is a strategic approach to managing information, processes and production inputs, in support of the phases of product planning, development and management over their entire lifecycle (Ming *et al.*, 2008). The PLM is recognized as one of the key leading technologies to facilitate companies to overcome a lot of challenges, which will offer companies a new way to rapidly plan, organize, manage, measure, and deliver new products or services much faster, better, and cheaper in an integrated way (Gecevska *et al.*, 2010). It enables the collaborative creation, management, dissemination and use of product definition and process operation information across the extended enterprise, i.e. from product concept to its disposal (Lee *et al.*, 2007).

Many authors (D’Amico *et al.*, 2013) state the PLM as very useful for fashion firms since it can help to handle the complexity by which they are characterized, in terms of:

- supply variability, which consists of the innovation degree of different supply components;
- supply variety, that is, the number of the products and their components (i.e., models, fabric, size and colour) within a specific collection;
- importance of the service provided by the fashion firm to the retailer: the growing complexity due to supply variety has an impact on the production cycle length and, consequently, on the level of the service provided;
- need to reduce the lead time.

In the fashion context, the PLM function is a tool with which to provide firms with mechanisms designed to adequately and effectively handle relations occurring between the subjects involved in the production chain. Cooperation and information sharing between the subjects involved, both inside and outside the production chain, are crucial to the development, manufacturing and distribution processes. Furthermore, a PLM system makes communication simpler for subjects working inside and outside the production chain and reduces the associated costs (D’Amico *et al.*, 2013).

Moreover, today PLM is widely recognized as a business necessity for companies to become more innovative in order to meet current challenges such as product traceability, globalization, tighter regulations, and legislation (Corallo *et al.*, 2013).

The PLM allows then an approach oriented to the “sustainability fashion”, which involves any and all of the following: extending product life through classic design and durability, eliminating or reducing manmade fibre use, reducing waste, using recycled and biodegradable materials, employing new design and manufacturing processes, making less but smarter clothing, encouraging sustainable agriculture, and influencing the ethics of the fashion industry (Lin and Oxford, 2011).

It is confirmed even by Ming and Yan (2005) who state that there exist three major objectives through PLM, which are:

- customer benefit such as product quality and serviceability;
- company benefit such as product cost and profit;
- society benefit such as clean and green environment.

Therefore, PLM is a holistic business concept (Saaksvuori and Immonen, 2008); it is both a business approach and a software solution, which during the last years has evolved from a set of engineering oriented tools into an enterprise-level solution. As stated by Ameri and Dutta (2005), PLM can be seen either as a i) Business Strategy or as ii) Technology Solution. From the first point of view, it is aimed to create a product-centric environment, rooted in computer aided design (CAD), product data management (PDM) and Requirement Management (RM) systems and aimed to connect various product stakeholders over the entire lifecycle of the product from concept to retirement.

Therefore, few organizations evaluate the true benefits of PLM systems. The reason is mainly due to the lack of clear understanding of what PLM is and how it could fit with the needs and requirements of the companies in terms of compliance to international standard. In order to manage several aspects involving PLM, a full comprehension of possible development and improvement tools is needed, selecting the most appropriate ones to reduce the possible criticalities in the process of PLM development (Savino *et al.*, 2012).

The research methodology

The research methodology to carry out this study consisted of (i) literature review; (ii) interviews with manufacturers and experts of the leather and footwear industry. The interviews will be performed on footwear industries located in the district of the “Riviera del Brenta” of the Veneto Region in Italy.

The interviews will be supported by open-ended questionnaires divided in four sections:

1. Company description: this section provides some descriptive statistics of the sample firms. Collected data are referred to: turnover; turnover breakdown by country; foreign markets of interest. In this section we will also detect whether there is a relationship between firm size and the adoption of PLM tools;
2. Internationalization strategies: this section analyzes both the entry strategies and the competition strategies adopted by the sample firms in foreign markets. We expect that the adoption of a differentiation strategy, focused on the quality of the product, is associated with a larger use of PLM tools;

3. Quality management strategy: in this section we examine the international quality standards adopted by the sample firms and detect whether they have eco-label products. To our purposes, it is also interesting to study the impact of quality controls on the cost of the finished product. One of the PLM goals is to reduce both the costs associated with quality management and the time-to-market, ensuring the compliance with the industry standards;
4. PLM: this section aims at checking the degree of knowledge and implementation of PLM in the companies. The investigation is at the level of PLM as a business strategy as well as set of technical tools.

The research plan will include to repeat the interviews in different footwear districts, national and international both.

The data from the interviews will be submitted to statistical as well as through advanced tools analysis in order to find out at least:

- Correlation among the implementation of PLM tools, the degree of internationalization and the compliance to international standard/regulation;
- The set of PLM tools more useful to the aim of internationalization in general;
- The impact of PLM on other dimension of business (Service Level, Quick Response, etc.)
- The influence on the implementation of PLM of the business model of the single firm as well as the whole district which the firm enjoy to.

The footwear district of the Riviera del Brenta

The footwear district of the Riviera del Brenta includes a thousand companies with over 20,000 employees and a production of 55 million pairs of shoes per year.

The total value of the footwear production of the Riviera del Brenta represents 51.3% of the Veneto Region's turnover and 13.1% of the Italian one. The whole footwear industry of the Riviera del Brenta (shoe factories, accessory manufacturers, shoe designers, trade companies) represents 50.9% of the value of the sales recorded by the industry of the Veneto Region and 13.2% of the total Italian sales.

The total district's production amounts to 1.640 € billion, of which the 91% is exported.

Veneto, in fact, ranks first among the Italian regions, representing about 28% of the total national export of shoes. The district companies offer stylish, high-quality shoes that represent the best of the Made in Italy production.

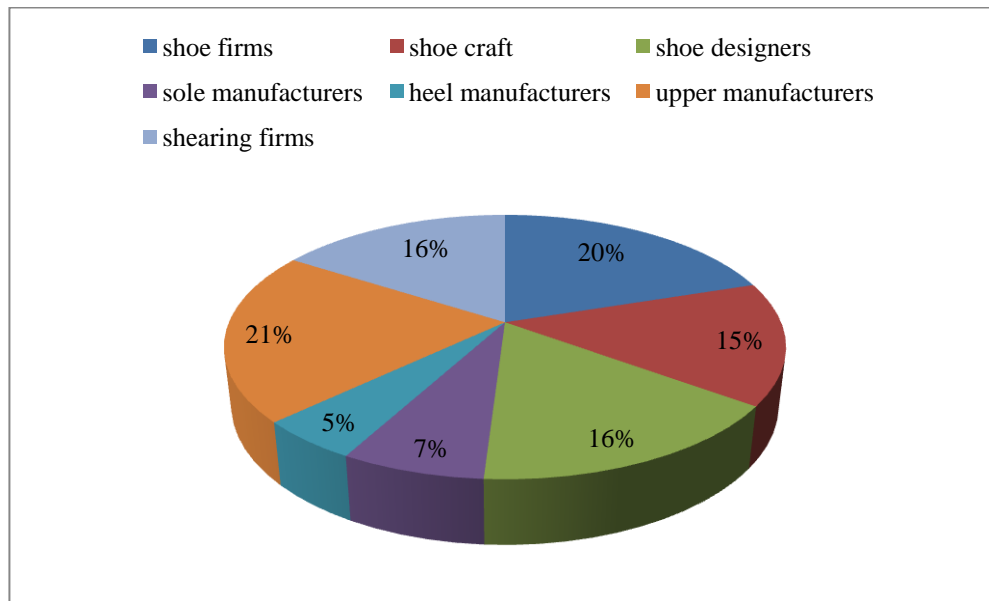
Most of the production includes luxury women's shoes that are produced for the most important international brands.

Sample building

It will be adopted a stratified sample, which has the advantage of improving the efficiency of the estimates by reducing the number of companies to be sampled, while maintaining a good representation of the variability of the universe.

For the stratification of the sample we will use, as a variable, the company's fields of activity: shoe firms; shoe crafts; shoe designers; sole manufacturers; heel manufacturers; upper manufacturers; shearing firms.

In order to make the sample representative of the Riviera del Brenta footwear industry, it will be composed as follows:



Findings

At this stage the research is focussed on the development of the questionnaire that has been completed at the end of October 2013.

The second phase is the survey through questionnaire and interviews in order to find the answer to research questions and to collect data to explore them deeply. This phase will be conducted in November 2013 and preliminary results from analysis will be available before the end of December 2013.

Originality/value

The company that wants to sell its products in a foreign market must have assessed the implications of different technical regulations, certification and quality standards required in different countries, not to have to bear huge financial losses, to slow down the product entry time or, at worst, having to give up their export program. In this direction, the possible link between PLM and compliance with the international standards would provide enterprises with information about the use of an instrument to contribute to the internationalization process and to reduce the associated risks.

Should the Riviera del Brenta firms adopt PLM tools, they would be characterized by a lifecycle-oriented strategy that is a relevant driver of market competition.

Furthermore, if compliance with the international quality standards is a condition for entering foreign markets, compliance with the voluntary ones (i.e., technical standards, eco-labels and private labels) is a tool to differentiate their production in an increasingly dynamic and global market, where there is a clear need for firms to stand out and make innovations in order to grow and be competitive.

Should the research show that firms belonging to the Riviera del Brenta district make use of the PLM tools, it would be interesting to extend it in the following areas:

- Firms adopting PLM are really lifecycle-oriented? What is the impact of the customer into the product design process? And of the suppliers?
- What is the impact of the adoption of PLM tools on the organizational structure? Do they involve the shift to a philosophy of collaborative work?

Conclusion

This working paper represents the first step of a research with the aim of evaluating the impact of PLM on a firm internationalization in the fashion industry. We are facing firstly with the primary challenge for a firm to comply with international directives, standards and regulations and we are pursuing our research question through a survey in one of the most important footwear district in Italy. At the stage of the research we don't have any data to present in order to support the idea, but the preliminary contacts with the district and the literature review make us really confident for the consistency of the results. The next issue will be the analytic stage of data.

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