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# PLENARY SESSION



## Centric

**How Mobile Apps can increase productivity of PLM users, make their work more accurate and their life easier!**

**Authors:** Antonello Mele (Technical Sales PLM Specialist), Silvano Joly (Country Manager)

**Affiliation:** Centric Software

### Abstract

Centric Software PLM Platform Centric 8 focus exclusively on the product development for retail, apparel, footwear, luxury goods and consumer goods companies. The product itself has an Intuitive, user friendly user interface completely web-based that can satisfy all Users in all roles in a Fashion/CG Company. This can give Customers a “single version of the truth” and solidly launch all activities: line planning, global sourcing, calendar management, materials management, quality management, collection management, technical design and retail execution. Since the earliest versions Centric Software has been the first (and unique) Vendor offering fully integrated PLM mobile apps to keep Product Team connected whenever and where ever they. This enable remote (and reluctant) users to address at the best product inspiration, development and execution. In the session it will be possible to see live in action some of the 13 Apps: Product Notes, Field Testing, Capture it, Material Sample, Sample Review, Fit review, Factory Audit, Collection Book, Switchboard.



## University of the Arts London

### Rethinking the customer journey between digital and physical spaces

**Authors:** Matteo Montecchi, Senior Lecturer in Fashion Marketing, The Fashion Business School, London College of Fashion, University of the Arts London.

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#### Abstract

In a challenging global economic environment, the fashion retailing sector is becoming more competitive and fashion customers more sophisticated in the way they research, assess and select fashion products. Younger and sceptical buyers demand sophisticated digital engagement and 24/7 access to customer-centric distribution channels designed to respond to their evolving and diverse needs. Consequently, fashion companies must invest in new ways to incrementally blur the thin lines which divide physical and digital environments and touch points. The omnichannel strategy is often considered a sustainable configuration to meet evolving customers' demands but its implementation requires a careful coordination of numerous and complex factors. This session will review the concepts of omnichannel within a fashion retailing context and assess the barriers to its implementation when designing compelling customer's journeys. Preliminary results of our investigation show that the challenges to the implementation of the omnichannel model revolve around three macro areas, namely infrastructural, procedural and organisational. There is a pressing need to coordinate the various channels flows (i.e. physical, economic and information/data) in order to respond to the challenges identified.

*(Note: this is stage two of a research project currently undertaken by Matteo Montecchi, Senior Lecturer in Fashion Marketing, The Fashion Business School, London College of Fashion, University of the Arts London and Jenny Wilson, Lecturer in Retail Management, Operations and Strategy The Fashion Business School, London College of Fashion, University of the Arts London)*



## Fairdynamics

### Multimethod simulation modelling with AnyLogic

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**Affiliation:** Fairdynamics

#### Abstract

There are three major methodologies used to build dynamic business simulation models: Agent Based Modelling (ABM), Discrete Events (DE), and System Dynamics (SD). Each of these approaches assumes different levels of abstraction, simplification, quantification and analysis. Growing the complexity of the world we live in, problems cannot always completely conform to one to the three existing paradigms. Thus we moved from the choice of a specific methodology to the combination of several of them in order to better address business problems. This is what we call “multimethod simulation modelling”. AnyLogic is actually the only platform that allows multimethod modelling, letting the user choose for the most efficient modelling technique, or a combination of them whether required.

# SUSTAINABILITY IN FASHION

## Social sustainability practices in the textile sector: mapping the field

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### Abstract

Today textile companies are increasingly called upon to include ethical and responsible factors in their core business, in order to achieve long-term competitive advantage and to contribute to change the traditional, and unsustainable, model of economic growth. In this context, the paper investigates how textile companies are addressing the social pillar of sustainable development to create sustainable value for their stakeholders.

The research work is structured in two phases: the first part shows the creation of a theoretical framework containing different social sustainability practices that a company may adopt, developed by reviewing specific literature and by studying European best practices. In the second part of the paper, this framework is used to conduct a survey among Italian textile companies in order to map their efforts towards social responsibility.

The results highlight the need of a concerted effort by all actors along the textile value chain, including companies, policy makers, research centers, universities and final consumers towards the common goal of sustainable development.

## **Sustainability certifications and labels for the fashion industry: selection guidelines**

**Authors:** Donatella Corti

**Affiliation:** University of applied sciences and arts of southern Switzerland (SUPSI), Switzerland

### **Abstract**

In recent years, bigger and bigger attention is addressed towards the sustainability concept at all levels of the fashion supply chain. One of the main triggers of this trend is the increased awareness of the final consumers whose needs and wishes are translated in new requirements for the supply chain actors, from downstream to upstream, in a life cycle perspective. At the same time, there is a flourishing of certifications and labels related to different sustainability aspects and, often, it could be difficult to perceive the peculiarities of each instrument. In order to adopt them as a strategic lever in the sustainability management, it would be useful to have some support to make informed decisions about which instruments meet at the best the needs of customers, whilst reflecting the actual performance of a company. This paper develops a set of guidelines that could support companies belonging to the fashion supply chain in identifying which tool, certification or label, is the most appropriate considering the specific context. Available tools have been first identified and, then, classified mapping and assessing them against a set of criteria that resulted to be relevant in the fashion environment. Though the research takes advantage of the authors' experience in the field, the paper is mainly of a conceptual nature. Empirical validation of the guidelines is the necessary next step to refine and complete the proposed guidelines.

## How to Evaluate Sustainability? A Matrix for Product Classification

**Authors:** Hakan Karaosman, Alessandro Brun

**Affiliation:** Politecnico di Milano, Italy

### Abstract

The fashion industry is characterized by low supply and high demand uncertainty, and is further portrayed with shorter product life cycles, highly volatile market demand alongside downward price pressure, international sourcing, high product variety and low predictability. In this global setting, fashion companies aim to provide the final consumers with a wide range of products by pursuing a number of inbound and outbound logistics management practices. However, fashion products are associated with a significant footprint left on the environment as well as on the societies. For example, 20,000 litres of water is required to produce one kg of cotton and almost 168 million children work at all stages of fashion supply chains including cotton production in Benin, harvest in Uzbekistan, yarn spinning in India, and different phases of garment production in Bangladesh. Thus, products growingly expect to be linked with the implementation of environmental and social standards. Nevertheless, it has been observed that acquiring sustainability related product information is never easy for the final consumer. Given that a product would only be considered sustainable if the production processes implemented at the chain level would meet sustainability requirements, this study aims to create a matrix to classify products according to their sustainability score.

With a final goal of classifying the products from being completely sustainable to being non-sustainable, the matrix is set to encompass four main components pursuing the logic of a product life cycle, including design, production, retail / distribution and communication. Conceptually, each of these four components has specific metrics acquired through an in depth literature review. Further, each metric consists of sub-metrics that collectively deepen the peculiarity of specific components. For example, the category design phase is to have a total number of seven indicators, which are to be given a weight depending on the information revealed. Through scaling each category and then summing up all points acquired, the matrix aims to provide a quantifiable degree to classify products in terms of their sustainability nature.

Finally, all final points are to be inserted in the classification matrix to classify the product in the following categories: Front Runners (referring to high environmentally sustainable products), Runner Ups (referring to medium level environmentally sustainable products), Slackers (referring to low level environmentally sustainable products) and Underdogs (referring to non environmentally sustainable products).

# NPD AND PRODUCT LIFECYCLE IN THE FASHION INDUSTRY

## **News approaches (insights) to NPD on the fashion segment: the power of social networks and the system see now buy now**

**Authors:** Helen Tatiana Takamitsu , José Alcides Gobbo Junior

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### **Abstract**

Digitization and social media have influenced retail advertising and created new forms of commerce, consumers are now accessing Facebook, Instagram, Snapchat and Twitter as well as various applications to make immediate product buying decisions. In this market scenario where consumer interaction and immediacy became important items to be considered by fashion brands, the "See Now Buy Now" (SNBN) business model emerges as a response to this new market. This change where the product is available for sale right after the runway show and collections launches causes changes in supply chain planning and the whole process of new product development, requiring a more flexible and adapted NPD (new product development) with new processes and timelines. Thus, this article aims to propose a holistic and hypothetical NPD model based on the Agile Stage-Gate theory, within the SEE NOW BUY NOW (SNBN) theme, with the lead user interaction as the leading process development metric.

**Keywords:** fashion, network, new product development, Fashion manufacturing industry, supply chain, social influences, social media.

## When Product Development meets Luxury: a case study analysis in fashion, food and furniture companies

**Authors:** Elisa d'Avolio<sup>(1)</sup>, Claudia Pinna<sup>(2)</sup>, Romeo Bandinelli<sup>(1)</sup>, Rinaldo Rinaldi<sup>(1)</sup>, Sergio Terzi<sup>(2)</sup>

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### Abstract

The luxury market segment includes different industries in its aura of high quality and price. The Italian excellence is ascribable to the three F (food, fashion and furniture), that have in common the importance they are paying to the Product Development process. The objective of the present study is to explore product development and the need for ICTs in fashion, furniture and food companies belonging to the luxury market segment. Strategies, activities, issues in process management and the most used ICTs are analysed.

Comparing these sectors, the authors have been able to identify commonalities and differences. With the aim to investigate also improvement areas, several best practices and a cross fertilization are discussed.

## **Big Data analysis techniques for supporting product lifecycle management in the fashion industries**

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### **Abstract**

A peculiar characteristic of Fashion System is a natural predisposition to transformation: it is in fact within the DNA of each firm the power to reinvent its own collection at least two times per year, and if that had been confined only once to the stylistic area, it is today essential to extend this capability to all the processes.

Therefore, fashion companies have to balance the need to reduce lead times of collections, minimizing stocks and obsolescence risk, acquire information from coming from digital and social media channels, guarantee a high level of quality and let the customer involved into the processes of product development.

If we consider all these processes as optimization processes, we need to know them to make the right decision at the right moment. This knowledge can be acquired exploiting the huge amount of information that is hidden in the big data generated by these processes.

Consequently, in order to answer to those challenges data collected during the whole Product Lifecycle Management (PLM) and social media are analyze by Big Data Analytics methodologies in the Fashion System.

Aim of this approach is to understand what are the inputs, the outputs and the possible constraints throughout the supply chain. Examined the criticalities and the problems of each PLM phases, it will be more immediate recognizing which are those that most can benefit from valuable amount of data. At this point some of the most important and sophisticated applications of Big Data Analytics will be described to understand where, in the NPD process, they can indeed bring advantages. These applications are sentiment analysis, visual sentiment analysis, intelligent video analytics, and geospatial analysis.

Sentiment analysis (SA) refers to the use of natural language processing, text analysis, computational linguistics, and biometrics to systematically identify, extract, quantify, and study affective states and subjective information. Sentiment Analysis input taken by this technique is represented by a text in form of online reviews, blogs, online forums, social network posts and so on. The task performed by SA is simply analysing the texts that contain people's opinions toward a specific entity (products, organizations, individuals, and events) in terms of: terms presence and frequency, parts of speech (e.g. adjectives), opinion words and phrases (e.g. good or bad, like or hate), negations. As a result it is possible to determine the consumer's attitude and opinion (positive or negative) and gives the relative score in real time.

Visual Sentiment Analysis (VSA) is based on visual content such as images and videos does not only contain objects, locations and actions but also cues about affect, emotion and sentiment. Such information is very useful to understand visual content. Visual sentiment analysis aims is to automatically recognize positive and negative emotions from images. Visual Sentiment Analysis input taken by this second technique is represented by images and photos posted on social networks (Facebook, Flickr, Pinterest, Instagram...). Then through artificial intelligence software (image recognition) it is possible to recognizing and describing the content of photographs. Once they were limited to recognizing individual objects, now new software can identify entire scenes. The analysis can in fact determine the sentiments expressed in the image, the clothes brand wore, the location... If the image is also tagged, it is possible to find correlations between the publisher and the viewer affect concepts.

Intelligent Video Analysis (IVA) works more than image processing. With back-end analytics and management platform seamlessly integrated with front-end devices, intelligent video analytics can serve a variety of purposes to benefit business and organizations. Video Analytics input taken in this case is represented by the registration of videos through cameras in the shops. There is a variety of techniques, among which video camera, point of sales systems, Wi-Fi and Bluetooth-enabled mobile devices to monitor, analyze, and extract meaningful information from video, both real-time and prerecorded. Thanks to video analytics it is possible to study the entire group of people (e.g. family members who shop together), without missing data on those who do not interact with the store at the cash register. The analysis provides in fact information about the size of the group, the group's demographics, and the individual members' buying behavior (e.g. how shoppers move around the stores, what are their interests, what captures their attention, how long they stay in the shop...).

Geospatial analysis (GA) is an approach to applying statistical analysis and other analytic techniques to data which has a geographical or spatial aspect. Geospatial Analysis inputs taken by the this last technique are represented by GPS (Global Positioning System) devices, RFID (Radio Frequency Identification), customer address got through fidelity card, IP address provided by an anonymous web feedback geo-resolved, and bar-codes. Thanks to software capable of geospatial representation and processing, and use of geographic information systems, it is possible to select routes, examine the structure of relationships between social entities (persons, groups, web sites...). As a result, companies can get traffic sensor, road network, vehicle data, people location, diffusion of innovations and rumours, weather forecast.

This study shows that through Analytics, a deeper understanding of a process is possible, providing new insights on the mechanisms behind it and hence, new, relevant information for the decision maker to improve PLM performances of Fashion System.

# SOCIAL MEDIA AND DATA ANALYSIS IN THE FASHION INDUSTRY

## Fashion #MadeinItaly: what do you mean?

**Authors:** Valentina Mazzoli<sup>(1)</sup>, Diletta Acuti<sup>(1)</sup>, Lorenzo Magherini<sup>(2)</sup>, Romeo Bandinelli<sup>(2)</sup>, Raffaele Donvito<sup>(1)</sup>, Rinaldo Rinaldi<sup>(2)</sup>

**Affiliations:** <sup>(1)</sup> Economic Department, University of Florence, Italy, <sup>(2)</sup> Industrial Department, University of Florence, Italy

### Abstract

**Purpose.** This paper aims to define the overall Made in Italy perception within the on-line and off-line contexts. Particularly, authors attempt to consider three main aspects; the first one regards the key product categories linked to the Made in Italy imaginary; the second aspect concerns the key characteristics linked to the Italy Country Image and the overall sentiment related to it. Finally, the research aims at identifying whether Italian brands enhance their Country of Origin (COO) image or not.

**Methodology.** With the purpose to achieve the goals of the paper, authors carried out a content analysis on Instagram posts related to #MadeinItaly and expected to confirm these preliminary results with a survey on a sample of 112 Made in Italy consumers in the specific context of the Brazilian market.

**Findings.** As expected, the survey confirms the content analysis outputs. Particularly, Fashion results as the first product category associated to the made in Italy imaginary, strictly related to the design and prestige of the production. The overall sentiment toward the Italy Country Image is positive. Moreover, the most renowned Italian brands belong to the fashion sector and enhance their Country of Origin (COO) image.

**Practical implications.** The analysis of Instagram confirms user-generated contents as important contributors for the Country Image construction. Indeed, the keys elements describing the Italy Country Image emerged from the web analysis as well as from the survey, allowing managers and practitioners to use it in their communication strategies.

## **Community Based Social Media Fashion Branding: Do Fashion Brands Heritage and Prestige Affect Consumers' Brand Loyalty Intention?**

**Authors:** Gemma Nesi, Riccardo Rialti, Lamberto Zollo, Cristiano Ciappei

**Affiliation:** Economic Department, University of Florence, Italy

### **Abstract**

This research explores whether fashion brands heritage and prestige perceived by consumers affect their brand loyalty intention. Specifically, the research aims at investigating if heritage and prestige matter in branding strategists based on engaging consumers in social media brand communities. Social media brand communities initiated by fashion brands represent the setting of this research. In fact, it has been assessed that members of brand communities usually are more informed on brands products and value than the average consumer. In order to achieve the aim of the research, a moderated structural equation modeling analysis has been developed and tested. Results show that, on the one hand, heritage has a negative moderating effect on the relationship between consumers' engagement in online communities and brand loyalty intention; and, on the other hand, prestige showed a positive moderating effect on such a relationship. Managerial implications and suggestions for future researches are discussed.

## Fast –Fashion: Fast Enough to Satisfy Adolescent Girls’ Expectations from Their Clothing

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**Affiliation:** <sup>(1)</sup>Faculty of Textile Technologies and Design, Istanbul Technical University, Istanbul, TURKEY, <sup>(2)</sup> LC Waikiki Corporate Academy, Istanbul, TURKEY

### Abstract

World-wide and also in Turkey, little research has been done on adolescents as a consumer market, especially regarding their evaluating criteria, expectations and problems relating to clothing. The research was therefore conducted to explore and describe the adolescent female consumers’ expectations and evaluations related to her selection of clothing. In doing so, it mainly focused on the fit of cloths. The survey was applied to more than 200 adolescent girls who were randomly selected from the most populated areas of Istanbul. The participants were within the age range of 9 to 16. The data collected were analysed using IBM SPSS (23), based on the relevant statistical significance and data summary techniques. The chi-square analyses were also conducted to seek the similarities (or dissimilarities) between the age groups and their major clothing problems.

**Keywords:** adolescent, fast-fashion, apparel, retail, clothing.

## **A woman's touch in fashion forecasting: combining analytics & experts' judgement**

**Authors:** Roberta Sirovich<sup>(1)</sup>, Giuseppe Craparotta<sup>(1)</sup>, Elena Marocco<sup>(2)</sup>

**Affiliation:**, University of Turin<sup>(1)</sup>, Evo Pricing<sup>(2)</sup>

### **Abstract**

For high-end fashion retailers the problem of stock allocation is at the same time crucial, given the high item values, but also challenging, given the relatively low and difficult to forecast sales levels. The authors have developed an innovative solution that is based on the collaboration between artificial intelligence and human intuition.

Each week, the central system assigns a budget to each store (positive or negative), and recommends SKU/sizes to order and release. Each store manager is thereafter given a time window to modify the proposal freely, within some strict budget constraints.

The artificial intelligence system receives all the store requests, and optimally allocates stock for trans-shipment or delivery from the central warehouse, based on the expected likelihood of sale minus cost of logistics, plus other management-defined constraints. We have successfully tested this system with a 13 weeks-long test versus control group experiment, where the control stores relied on a traditional headoffice-driven optimization, without the store managers' input. Not only did the new system improve store managers' morale through non-monetary incentive-driven empowerment, but it also improved store performance and profits. The brand boosted sales, demand cover, and stock rotation with an impact worth an estimated 2M EUR margin yearly.

## The High Diversity In Clothing

**Author:** Onen unlu, siir

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### Abstract

The high diversity in clothing is a result of globalization. However a sameness occurs in art and fashion area due to the commodification process where an international modernity dominates.

As a result Fashion leaders and cognizant are becoming concern about regional identity, ethnicity, ecology and sustainability and other issues as innovative in fashion and art.

Historically, from beginning of Industrial Revolution from 1789, the fashion and avant guard art production was innovative based upon the development in technology. With wholesale manufacturing, the fashion industry there came a requirement for designers whose job it was to provide consumer choice now constrained by an unsatisfactory identity of global modernity.

Whatever globalization brought that might be beneficial such as accessibility and rapidity information transfer, we now have a virtual lifestyle, as we face the risk of forgetting and losing individual and real identity in terms of connecting with our cultural heritage.

# FASHION SUPPLY CHAIN

## Mapping the value chain within a district: an application to the textile industry

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### Abstract

A lot of manufacturing industries are facing the need to reconcile global and local perspectives of their supply chains, especially when considering developed countries. On one side, the globalization phenomenon generated over time the so called Global Value Chains (GVCs), characterized by a high fragmentation degree; while at the same time, companies leverage on local competences and relationships, made stronger by the presence of Industrial Districts. This paper tries to fit the GVC framework into the local context, by developing an original mapping methodology which starts with the identification of the stages involved in a specific GVC, and then investigates which of them are done locally and to what extent. This way the researchers can capture the within-district heterogeneity (how much the companies belonging to the district differ each other, here considered in terms of their “manufacturing role”) as well as the global connection of the district. The methodology has been applied to the Bergamo textile and clothing district. Results provide some initial insights on how companies in the district under analysis strive to find distinctive traits in their manufacturing capabilities that could enhance their competitiveness in the district and in the GVC.

## eBIZ 4.0 new step to digitize the fashion supply chain

**Authors:** Bianca Bindi<sup>(1)</sup>, Virginia Fani<sup>(1)</sup>, Romeo Bandinelli<sup>(1)</sup>, Arianna Brutti<sup>(2)</sup>, Gessica Ciaccio<sup>(2)</sup>, Piero De Sabbata<sup>(2)</sup>

**Affiliation:** <sup>(1)</sup>Industrial Department, University of Florence, Italy, <sup>(2)</sup>ENEA, Bologna, Italy

### Abstract

The present paper aims to analyse the main barriers and drivers that obstacle and push the adoption of an eBusiness standard, such as eBIZ, and IoT technology, such as RFID, within the fashion industry. This purpose represents the first step of the European project "eBIZ 4.0 – Enhancing textile/clothing sector by eBIZ and RFIDs technologies adoption", aiming to promote the integration between RFID technology and eBIZ standard for improving data interoperability among companies operating along the fashion supply chain. The tool used for this kind of analysis has been an online survey dispatched to the mailing list of all the project partners belong to different European Community countries and involving both software houses and fashion companies. The survey results have been crossed with the external variables that characterize the analysed companies, in order to classify the evidences related to one or another cluster of companies similar in terms of external variables such as dimension, headquarter location, industry segment.

## **Resilience in the fashion industry supply chain: state of the art literature review**

**Authors:** Sara Antomarioni, Maurizio Bevilacqua, Filippo Emanuele Ciarapica, Giulio Marcucci

**Affiliation:** Università Politecnica delle Marche, Ancona, Italy

### **Abstract**

In a complex and unpredictable world, nowadays classic risk management techniques are often not sufficient neither adequate to face the occurring disruptive events. When black swans events (low probability – high impact events) take place, many supply chains are not qualified to tackle those happenings in an efficient way. A resilient approach can fill this expertise gap, providing the necessary knowhow and mindset qualities to supply chain players in order to better tackle those rising disruptions. In particular, resilience is a key component in the fashion industry supply chain. In the last decades, many companies declined and retired, while several thrived. The resilience approach was one of the keys that divided successful firms from the unprofitable ones. This research provides a broad view of the literature review about resilience approach within the fashion industry supply chain. Furthermore, in order to assist academics and supply chain decision makers, this study will extensively show the state of the art of the current methodologies used to assess and measure resilience in one's supply chain.

## Dual frequency tag performances in the fashion industry

**Authors:** Andrea Volti<sup>(1)</sup>, Antonio Rizzi<sup>(1)</sup>, Rinaldo Rinaldi<sup>(2)</sup>

**Affiliation:** <sup>(1)</sup>University of Parma, Parma, Italy, <sup>(2)</sup>University of Florence, Italy

### Abstract

The presentation strives at benchmarking performances of dual frequency inlays, operating in UHF and HF bands, when deployed in the apparel logistics and end-user retail processes. The developed testing protocol makes it possible to assess performances of RFID devices in simulated supply chain and end-user-oriented processes. It has been designed according to the needs for identification both for the supply chain and the end users, who can take advantage of the adoption of NFC technology. We applied the testing procedure to four RFID inlays equipped with an innovative IC and two antennas, capable of managing both EPC communication in UHF band and NFC communication in HF band with smart devices. The performances of the inlays have been compared to standard tags commonly used in EPC and NFC fields. We measured and compared read rate, accuracy, and read time when testing EPC capabilities, and read/write throughput, time and distance when measuring NFC functionalities. By simulating a real-world environment, test results give a direct insight of performances to be expected from different dual frequency RFID inlays. Therefore, IT and logistics managers can find answers to how these innovative tags perform and which would be the best choice for new RFID applications.

## How to implement RFID in the Fashion Supply Chain

**Authors:** Alicia Gonzalez Rodriguez, Rinaldo Rinaldi

**Affiliation:** University of Florence, Italy

### Abstract

The Radio frequency identification (RFID) technology has been widely adopted in various industries to increase the efficiency of business processes. Improving logistic processes and quality control, enabling full traceability, anti-counterfeiting, production progress monitoring, real-time data sharing and customer experience are some applications of RFID technology, thus representing an interesting opportunity to boost company's competitiveness.

The first RFID pilot projects conducted in the fashion industry dates to the 2000, but the technological advancements allowed the diffusion of more reliable and customizable applications in the last years, through more evolved tags at lower costs, wider range of readers or devices and better IT integrated solutions.

In order to support fashion companies in the implementation of RFID technology, the present work proposes a detailed framework that structures the most relevant aspects to be considered during the analysis and the re-engineering of the processes impacted by the integration of RFID. The challenges and issues, related with the management, the technology and the data within the specific context, could be overcome by adopting a structured approach for the development of TO BE scenarios, thus minimizing the risks of low system performances or low ROI.

