



Craftmanship and Digitalization in the Italian Knitwear Industry. A Paradigm Shift for the Narrative of Made in Italy

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Abstract. Knitwear is a consolidated industry in Italy and, at the same time, a typical expression of the Made in Italy paradigm linked to the ideas of craftsmanship. While, on the one hand, knitwear is associated with the idea of craft and manufacturing traditions, on the other hand, it is nowadays produced by numerical control machines (CNC) where the technological contribution and the level of automation are very relevant. The convergence of physical and digital environments, at the heart of the Fashion Industry 4.0 debate, is an established feature of knitwear design practice.

In the contemporary industrial scenario, knitted items are produced on digitally programmed machines through sophisticated software, and the manual contribution of the individual operator during the knitting phase is reduced to a minimum. In the light of these premises, this contribution questions the opportunity and value of the integration of digital technologies in the storytelling of traditional manufacturing without losing the power to evoke Made in Italy's values such as quality, aesthetic refinement, and exclusivity. To analyze these issues, the authors report the case study of SMT – Società Manifattura Tessile, a leading knitting company where the technological presence equals that of traditional manufacturing craftsmanship, keeping both elements at balance. The case study suggests the importance of the contemporary knitting craftsman to increasingly develop communication skills to make the relationship between technology and manufacturing explicit and possibly smoothly blend it with the Made in Italy archetypes.

Keywords: Knitwear · Craftmanship · Digitalization · Italian Knitwear Industry · Made in Italy

1 Introduction: Narratives of Made in Italy. Focus on Fashion

Widely treated in the literature, Made in Italy has been defined as an aggregation of heterogeneous sectors. Mainly belonging to the 4A stated by Fortis [1], namely Food, Fashion, Furniture and Automation (in Italian Alimentari, Abbigliamento, Arredo,

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Automazione) and located in local industrial clusters with highly skilled human capital and strong roots in craftsmanship [2, 3]. Together with the close relation with artisanal tradition, Made in Italy represents a vehicle for the symbolic value of Italian culture [4]. Thus, it involves not only the quality of the products but the ability to communicate values and meanings related to the Italian way of living [5, 6].

Product, cultural values, communication, plus what Verganti defines as “a special relationship with professional design communities and culture, where design moves from technological innovation, manufacturing specialization, and supply chain management to promote an innovation in product meaning” [7]: this is the essence of the Italian industrial model, and more and more these aspects are gaining relevance in the ongoing transition towards the Industry 4.0, with the adoption of advanced industrial technologies to pursue innovation in meaning and practice.

In the time being, there is indeed a detachment between what Made in Italy is today and the idea that the world has of it. If this concerns all the sectors, this article puts a focus on the Italian fashion industry, and precisely on the knitwear sector, that is par excellence labelled as the typical expression of the Made in Italy paradigm linked to the ideas of craftsmanship [8], while being one of the most advanced and consolidated industries in terms of industrial and digital technologies [9].

The narrative around Made in Italy fashion was initially created by the British and American press as a romantic idea of something “strictly related to the Italian Renaissance tradition characterized by the key elements of its cultural heritage and artisanal tradition” [6]. Luz Neira Garcia [10] recalls Eugenia Paulicelli when she explains that the campaign for the Made in Italy was launched in the 1970s to identify the Italian garment with “some examples of innovations in design and history that maintain and reinforce the high levels of Italian craftsmanship, attention to detail, beauty, and cultural heritage, the values that define the Italian character and style at its best.” [5].

From there, Made in Italy has been depicted with images related to craftsmanship, slow artisanal procedures, manual expertise of elderly people; but this idea of handcrafted luxury that still many brands ride with their communication, no longer has anything innovative [11] and is associated with misleading stereotypes and narratives that “mix reality and fiction in order to produce a credible symbolic meaning for foreign consumers” [6].

If we go back in time, to the birth of Italian fashion with Giovanni Battista Giorgini in 1951, that romance does not find any correspondence with the very precise idea that Giorgini had: he selected the most contemporary companies of the time, he planned events, he chose collections and products, and made those companies operate from a local to a global scale. This first intuition made possible the raise of the typical entrepreneurship of Italian fashion: a kind of entrepreneurship directly based on the continuous innovation of creative and manufacturing processes and “is today one of the most mysterious and least studied sectors, even if it is the founding part of the Italian system and therefore also of the meaning of Made in Italy” [11].

For knitwear, the innovation and update of industrial manufacturing processes led to a production made by numerical control machines (CNC) where the technological contribution and the level of automation are very [12] and the convergence of physical and digital environments, at the heart of the Fashion Industry 4.0 debate [13], is an established feature of knitwear design practice.

Is there the possibility to integrate digital technologies in the narratives of traditional manufacturing without losing the power to evoke Made in Italy's values such as quality, aesthetic refinement, and exclusivity?

2 Why is Digital not Included in the Narrative?

Indeed, some examples confirm how this is possible; think of Artnit Studios, BSamply, Italian Artisan, and Up To You Anthology - born to connect in an innovative way the different subjects involved in the design and production processes of fashion [14].

Nevertheless, why is it still difficult to talk about digital? Why is digital often not included in the storytelling of the realities of Made in Italy and appears to be in conflict with some of its archetypical images, such as craftsmanship, *savoir-faire*, slowness?

We can find an answer considering that made in Italy comes from an idea linked to the social capital of the districts in which it is formed. Social capital is understood as "a set of active relationships between people" in which "trust, understanding reciprocal, shared values and behaviors keep the members of a community firmly united and make cooperation possible" [14].

Moreover, Made in Italy has a strong link with the physical interaction with the product and interpersonal relationships, which fall when the processes are digitized.

Even if active interpersonal relationships can therefore be cooled with digital, as the physical distance between people increases, there are aspects related to this that represent opportunities and assets. These are not only resources from a production and design perspective, but also narrative and communicative.

The article reports here some case studies related to three levers for innovation that can be strengthened by the digital dimension: personalization, non-standardization, and tailoring.

The first lever is customisation, defined not only as personalisation that offers the customer an experience, but also one that enables a lower environmental impact by reducing waste.

In this sense, UnmadeOS helps fashion and sportswear brands realize the full potential of products, unlock market opportunity, and connect demand directly to production. This operating style leads the end customer to interact with simplicity, creativity, and fun in their knitwear design and produces exclusively what has been already sold, eliminating large scraps and waste of the clothing world.

The second lever is non-standardization. The authors notice a vast improvement in the industry when industrial automation, business, and trade are integrated [15]. An example of this is how software, such as computer-aided design (CAD) and computer-aided manufacturing (CAM), can now interact with innovative physical prototype systems in real-time via 3D printing integrated with CPS and augmented reality [16]. This interaction allows for a development of the Internet of Things (IoT), where physical objects communicate with each other to share formation and coordinate decisions, and also an Internet of Services (IoS), concerned with the systematical use of the internet for new ways of value creation through the materialization of Product-as-a-Service (PaaS) and establishing a direct link to consumers offering them complementary services [17].

The case study related to this lever is Stratasys, a company that produces 3D printing systems, quality materials, software connected to the cloud, and a wide range of services have transformed the entire value chain of development and digital realization of products that go towards a non-standardization.

Thanks to its innovative 3D machines, Stratasys can make various products that can be designed, prototyped, and produced without the need for large production. The precision design and breadth of remarkable materials that adapt to the needs of many brands have managed to lower the cost by increasing efficiency and the possibility of creativity.

Tailoring is the third lever and among the most representative examples where tailoring interacts effectively with digitalisation is the case of Lanieri.

Lanieri is the first e-commerce platform to offer online menswear entirely made-in-Italy and made-to-measure, drawing on slow fashion and locally sourced drivers [18]. In fact, Lanieri was born as a purely digital brand that offers services of sartorial excellence.

In this regard, there is no doubt that digital transformation and technological innovation have put many players in front of a great opportunity: to revolutionize the way we see things, do business, and offer services. Being digitalization so relevant in the updating of processes, how could it be also relevant in the updating of how these processes are told in the narratives around Made in Italy?

3 Italian Knitwear. The Experimental Case Study of SMT, Società Manifattura Tessile

As previously mentioned, this article explores the different possibilities behind the digital transformation of manufacturing and artisanal activities.

The authors choose to apply these theories to the field of Italian Knitwear, an industrial sector hinging on many of the traditional and symbolic images described in the previous paragraphs.

Integrating a symbolic reference to Made in Italy [19], knitwear is often associated with the narrative of “slow manufacturing”, leveraging on images of traditional craftsmanship, slow artisanal techniques and handmade products.

Knitwear, as a technique for producing a textile element, has long been associated with the idea of manual and hobby work [20], and even after the introduction of industrial looms in the 16th century, the manual element remained very much present [21]. Throughout the 19th century and most of the 20th, progress in the knitwear industry was aimed at making production technology more efficient [22], while maintaining the manufacturing vocation of this industrial sector linked mainly to the stages of prototyping, quality control, linking and finishing. At the end of the 1970s, the advent of analogue knitting machines marked a sudden shift from a scenario of craftsmanship made of individual producers to a prevalence of the technological element over the manual one [23].

Technology has become a predominant part of knitting companies, and the professional figure of the knitter has moved from that of a craftsman with manual skills to that of a software programmer. This digitalization process allows to produce highly refined

and creative products, which would have been inconceivable using manual production techniques or mechanical looms.

This research then investigate how the archetypal Made in Italy narrative has taken this digital shift into account, trying to identify its level of integration into the storytelling of luxury craftsmanship.

In order to do so, the authors analyzed the case study of SMT – Società Manifattura Tessile, a leading knitting company founded in 1984 in the Province of Reggio Emilia, manufacturer of weft knitwear garments for French high-end luxury groups LVMH and Kering.

The company is a place full of creativity drives, where designers from all over the world go to “take inspiration”, participate in product development and meet with knitwear technicians to enhance their imagination.

The manufacturing process of SMT’s products encompasses all stages from design, through collection development, fashion show presentation to production and delivery to shops.

Everything begins with a sketch drawn up by a knitwear designer and is then handed over to SMT developers, who in turn select and purchase the necessary yarn(s), identify the most suitable knitting technique, and test the types of washing and finishing to finally produce the complete garment.

The garments produced in the company, far from solely being the result of craftsmanship and manual activities, stem from technical inputs and machine adjustments that determine the type of interlacing of the yarn and its arrangement.

The shape of the garment too is formed directly by the knitting machine on the basis of mathematical calculations made by the programmer and sent to the machine that, at this stage, manages these controls automatically. In other terms, in this area of the company, the manual contribution of the individual operator is reduced to a minimum if not completely absent.

Considering these premises, the dominance of technology within the SMT product cycle appears evident. Even from the point of view of the man-machine relationship, a single programmer/operator, through digital programming and remote controls, can preside over several machines simultaneously.

However, despite this technological extent, the artisan dimension – with a one-to-one man-machine relationship turns out to be dominant in the linking stage, where the piece of knitwear produced by the machines get assembled, and hand finished. In this department of the company, an operator works on a single machine, providing manual inputs and adjustments highly dependent on the degree of experience and manual dexterity.

Reasoning in terms of Made in Italy archetypes, this part of the company appears to integrate many of the typical images of “slow manufacturing” described in the previous sections. Moreover, besides traditional linking, this part of the production process is characterized by other manual processes such as hand finishing, hand embroidery or crochet, ironing, brushing, darning and so on.

In this regard, a stroll through the company departments reveals an iterative dialogue between craftsmanship and Industry 4.0 technologies, a place where these seemingly opposing drives seem to hold each other in constant balance.

The substantial presence of cutting-edge technology in the knitting, modelling and 3D simulation departments is in conversation with the areas of the company where the level of craftsmanship is highest and employees use tools such as knitting needles, crochet hooks or darning equipment.

In the final analysis, SMT seems to have integrated the “special relationship with professional design communities and culture, where design moves from technological innovation, manufacturing specialization, and supply chain management to promote an innovation in product meaning” [7].

In this sense, the dialogue between tradition and technology described here can act as a stimulus for the debate on Made in Italy in order to identify new levers and insights for its renewal.

4 Conclusions

Technological innovation triggered by information technology and telecommunications has contributed to radically overturning the forms of access to information, the organization models of production and the ways of consumption.

Digital transformation (DT) is becoming a prime topic for firms across the globe [24]. It is anticipated that companies that are unable to adapt to the digital world will undoubtedly fall victims to “digital Darwinism” [24], where incumbents may disappear and only the most adaptable enterprises, responsive to technological trends, will survive to remain on the competitive landscape [25].

The spread of technologies like the ones for additive manufacturing (3D printers) and robots at increasingly low costs marks a new step forward in the introduction of digital technology in business activities. These new technologies have a revolutionary impact not only because they contribute to substantially redefine the geography of production worldwide but also because they introduce new elements at the level of business strategies by providing companies with the ability to customize the production at levels they have never experienced before [26]. This is one of the challenges of the contemporary Made in Italy, where personalization distinguishes what is called Cultural Manufacturing.

The digital transformation requires companies to rethink their processes putting the consumer at the centre. Peter, in *the Digital Transformation Canvas. The 7 Action Fields of Transformation* [27] place a strong focus on customer orientation, personalised offers, digital communication and sales channels, envisioning the understanding of consumer behaviors and personalized offers for services and products as one of the key points in the future.

In a context that has been radically changed by technological innovation and by the consequences of the Covid-19 Pandemic, we are therefore witnessing a paradigm change where all the stakeholders no longer play the same role as in the past. In this context, we are in a moment when, taking up what Bettiol and Micelli wrote [28], Made in Italy can become a Cultural Experience that does not concern the production process itself but the context of use of the product, and this will happen just if we will be able to credibly rework our cultural roots. We are designing more and more products and services for a world subject to continuous disruption and Industry 4.0 should not be seen only from the technological point of view, but also from the point of view of the ability to coordinate

science, technology, skills and social context, in order to have the best ability to bring together different but complementary technologies, to respond both to the great global issues and to the individual demands of millions of people who are citizens even before being customers [29]. There is no longer the company at the center, but the man.

The complementarity of knowledge, the importance of relying on different skills to be harmonized on common objectives, activities and motivations represent the real challenge for any business idea [30]. A dynamic definition of creativity identifies as crucial elements of creative processes not only the potential originality of the contribution to knowledge, but also the degree of interaction with the social environment, that is to say how this creativity grasps and use the same context in which it was generated, to become an element of dynamism [29]. The artisanal production is an example of the advantages derived from using the same skills and the same machines to produce differentiated goods: the tailor who can make both wedding dresses and sports trousers has skills and equipment able to pass continuously from one production to another, of which in any case it carries out all the phases [29]. The elements that distinguish Made in Italy such as craftsmanship, authenticity, aesthetics, and cultural traditions take on meaning from a global perspective and they become an integral part of the fundamental narrative to tell the cultural complexity that underlies each product made in Italy, realized with the combination of the more traditional expertise and the more updated, technological one. If storytelling is no longer an activity delegated to external communication agencies but has become an integral part of what it means to be producers and craftsmen in the new millennium, all the components of being producers and craftsmen should be included in the story. In other words, knowing how to make and how to communicate are now merged skills, and in this sense, digital technologies could play an essential role in the new storytelling of the Made in Italy model.

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