

A NEW MANUFACTURING FASHION SYSTEM 4.0 COMPETENCE AND ROLES IN ITALIAN CLOTHING DESIGN AND PRODUCTION

GIANNI DENARO

Sapienza, Università di Roma
gianni.denaro@uniroma1.it

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Abstract

Fourth Industrial Revolution and digital technologies are driving profound transformations within the classical industrial system. Nevertheless, design and production models in Italian fashion system are not much into these type of changes. On the one hand, because of the cultural reasons related to the concept of Made in Italy – which quality is perceived as inextricably linked to the classic way of production. On the other hand, fashion products are difficult to patent, so companies face a lot of knots on legal protection of innovations.

This contribution wants to frame the current relationship between Industry 4.0 and Italian fashion system, presenting the state of innovations and limitations. The analysis of this picture will serve to illustrate how design can interact with other disciplines to manage the practices, the approaches and the tools, able to build a new useful design and productive models.

Keywords: Fourth Industrial Revolution, Digital Technologies, Italian Fashion System, 4.0 Competences, Soft Skills

Industry 4.0 in Italian Fashion Manufacturing

Economic and Social Scenario

Over the past decade, the internationalization of markets has changed economic, social and cultural conditions within fashion industry, revealing a system with limitation but opportunities to be caught. Italian fashion system has well handled the strong international competition, as evidenced by the increase in exports. According to Il Sole24ore analysis, referring to the year 2022, fashion system in Italy revenues hit 96.6 billion, the highest value in 20 years, a 16 percent more compared to 2021 (Casadei, 2022). These results were possible thanks to the flexibility of small businesses that were able to produce a recognizable product, being also able to cope with market changes.

In fact, the recognizability of the Made in Italy product has always been influenced by the particular conformation of these enterprises, whose production is concentrated in territorial areas with specialized manufacturing, the so-called Distretti industriali (Industrial Districts). This geographical concentration encourages collaboration among “neighboring” enterprises, leading to a contamination of knowledge that is reflected in the product.

The small size of these enterprises has been crucial in reacting with flexibility to the changes that internationalization has injected into the market; which has demanded for increasingly shorter delivery times. It is worth pointing out that 99 percent of businesses in Italy are micro, small and medium-sized enterprises, whose small size has proved advantageous in dealing with market demands (Rinolfi, 2017). Indeed, they have been able to quickly readjust their production and respond to market demands more promptly. Large companies, lacking structural flexibility, on the other hand, have adapted their production processes by introducing new Industry 4.0 systems. In most cases, these systems have served to reduce the prototyping, production and delivery time of their products and, at the same time, to involve the customer more closely in the various stages of designing the required good. (Rinolfi, 2017). In fact, customization is a response to the extensive conformism that globalization and internationalization have brought. Indeed, brands are demanding greater adherence to their production requirements so they can better meet the demands of an increasingly exigent clientele. According to Silvia Venturini Fendi, clients are

experiencing a new desire for unique products that reflects the necessity of individuality (Venturini Fendi, 2011). As highlighted by Salvatore Testa, professor of Strategy and Fashion & Luxury Management at Bocconi University, the advent of ready-to-wear has democratized fashion products, but it has downsized the personalization practices. The trend is reversing nowadays, since it is showing how clients are requiring more exclusive products. The satisfaction of this desire can be reached by technologies, that are also able to turn down costs and to faster the customization process (Pambianconews, 2019).

The application of advanced technologies is the almost exclusive prerogative of larger companies, as they have the economic resources to provide for their introduction. Such application has been crucial for them in compensating the lack of flexibility which belong to micro, small and medium-sized enterprises. The latter, therefore, have not been able to access technological renewal due to their limited liquidity, a fact that has limited their ability to compete with large companies (Ezio Tarantelli Foundation, 2017).

Thus, an ambivalent picture emerges within the Italian production: on the one hand, smaller

companies have a flexible production model, capable of meeting customization needs, but they are excluded from the introduction of new digital tools; on the other hand, larger enterprises are able to take advantage of such innovations, but they are not yet able to manage them virtuously, given that they have an inflexible production model [fig. 01]. In both cases, the question is how Italian fashion design and production can better exploit these resources in favor of contemporary market needs. In this sense, designers may be able to build an equitable system that can offer appropriate approaches to design and production, as well as to note which digital technologies are suitable for these purposes.

The Impact of Industry 4.0

The framed scenario highlighted the need for Industry 4.0 to realize those production paradigms and design approaches useful to meet market requests. In fact, these approaches need to face the new social needs related to the desire of customized products, through a judicious application of digital instrumentations.

Thus, enabling technologies cannot be applied solely as a technical tool to address and solve problems in

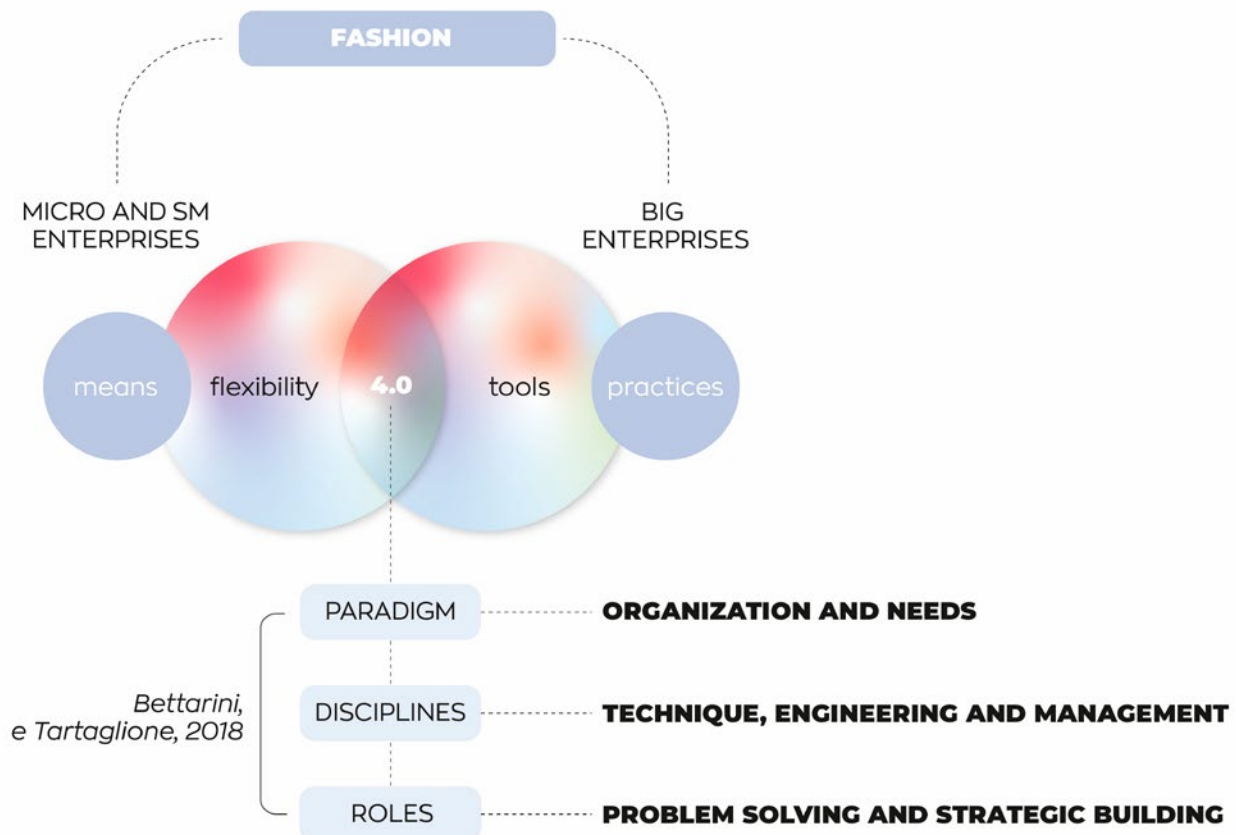


Fig. 01

faster time. These technologies have been recently conquered, and their possibilities beyond a technical-functional value are not yet duly tested. The challenge is precisely to envision useful applications for the establishment of a manufacturing 4.0 fashion system.

By framing this re-construction project, the application of new technologies, in order to be properly managed, subtend a process of job enrichment that – as argued by Gianpaolo Vitali from CNR – could put at the center human knowledge and its ability to interpret complex production phenomena; furthermore, the identification of solutions will be based on experience, so to characterize a context where products, processes and technologies will evolve similarly to these articulated dynamics (Filtem Lombardia, 2017). Human resources will have to be flexible to quickly acquire useful knowledge in handling these tools and to develop an adequate “digital thinking”. The necessity to handle technologies, at specific stages of the process, is a fundamental condition to realize this change, but it needs to be supported by transversal skills. The actors involved in the design and productive processes need to understand changes, so to satisfy these requests through the tools available to them. Therefore, it is necessary to acquiring a renewed problem solving approach and to develop management skills. This set of skills represents a system of capacities that can allow a horizontal communication among all the involved actors (Scheer, 2019). In contrast to the current approach – which tends to frame the work of operators as the execution of simple repetitive tasks coming from above – the digital operator will have to be multi-skilled, cooperative, and communicative: a more educated, digitized worker who communicates across the department, working in synch with team leaders, engineers, technologists, logisticians, and maintenance workers (Magone & Mazali, 2016).

All this will affect the industrial paradigm and the structure of the enterprise – no longer described as a place of mechanical application but as a dynamic entity that dialogues with the operators. It will be a matter of developing flexible environments, knowledge and skills that presuppose constant experimentation with new operational technologies.

The impact of Industry 4.0 in the specific clothing sector will thus be found on three different levels, which Bettarini and Tartaglione (2018) summarize as follows:

- definition of the paradigm shift – influenced by the impact of digital technologies on the production system, work organization and skills – that is flexible enough to promptly respond to changes;

- development of new knowledge, skills and competencies that can deal with emerging dynamics and that are able to describe and elaborate, with more immediacy and at a higher level of synthesis, the main transformations that will characterize the professions of fashion system;

- building a network of horizontal relationships, involving the main professionals, whose specific skills will be useful in addressing the changes identified as necessary to be satisfied.

The Evolution of Skills, Disciplines and Roles

Paradigm Shifts

The following section will highlight the changes at the paradigm level, related to the production system, the work organization and the skills. Within the Italian fashion system, digital tools are addressed to digitization processes on different levels, that have affected both the production system and the skills of workers, who have had to learn how to use new machinery and to manage it (Tartaglione, 2008). A part from this, the consistent change appears to be related to the demographic structure of the world population: there is a steady growth of the middle classes in newly industrialized countries (Tartaglione, 2008). This leads to an increase demand of diversification for fashion goods in these markets. The increased purchase capacity is forcing brands and manufacturing companies to think of new strategies to relocate and diversify their activities (Ferrucci & Picciotti, 2016). In addition, the liberalization of international markets has influenced the economic level, suffering from the confrontation between Made in Italy and a larger market that is not capable of recognize the characteristics of Italian products. In order to face this confrontation, Italy must necessarily leverage the qualitative increase of its productions, focusing on the intangible elements (Rullani, 2004), such as the skills linked with the territory. This will be possible through intensive research and development activities directed at continuous product innovations. Instead of marketing, it is therefore necessary to focus on strengthening the

research-development dimension, increasing control over the entire production chain and innovating those services related to traditional manufacturing activities (Assolombarda, 2020).

Innovations will therefore be focused on those process steps that can generate added value, and that will target well-defined product niches (Raele, 2019). This will ensure to faster reach the social changes related to demand and consumption. And thus, low-value manufacturing will instead be increasingly expedited in favor of more artisanal production.

Yet, the possibility of access to international markets is one of the causes that has generated the shift toward an artisanal manufacturing. Indeed, increasing consumer knowledge about environmental, social and economic sustainability issues has intervened to increase this shift (AA. VV., 2020). As highlighted by Simonte, the success of businesses operating in Italian fashion production have to start from the attention to detail and customization services offered by companies (Simonte, 2018).

Therefore, change must begin from the construction of more flexible processes, that can respond to customers increasingly attentive to quality, safety, and sustainability. Customization and personalization become essential services that brands and companies must be able to offer. Indeed, by linking production directly to actual demand, the entire system will be more efficient. Inventories and losses will thus be significantly reduced, and the link with consumers will also be strengthened. In addition, the strength of customized products or services lies in delivering to habitual customers the idea that they do not have to settle for mass-produced items, which are identical to millions of others, but they can state their specific preferences to be achieved (Livesey, 2010). This new structured system will clearly imposes a change within companies at the design and production level. In markets where preferences change rapidly, companies need to understand what consumers want and how to turn these demands into reality in both production and sales. So, manufacturing process must satisfy high quality standards to remain on the market: designers need to be aware of consumer preferences and production managers have to ensure on-demand production (Bettarini, and Tartaglione, 2018).

Disciplines and Skills: Design between Engineering, Technology and Management

According to Bettarini, Di Giacomo and Tartaglione, professionals need to develop the ability in making (including intellectually) through digital technologies, in order to accomplish a given objective, task or activity in a specific disciplinary or professional field (Bettarini, & Di Giacomo, Tartaglione, 2016). In this sense, these competences must be acquired both to enable the full application and the management of digital technologies, but also to meet production, social and economic needs that affects the clothing sector. These needs are related to the abilities to grasp the changes in taste and consumption; to anticipate the involvement of customers to experiment with new applications within production cycles; and to test new products and thus to renew their production (Bettarini & Tartaglione, 2018).

The creation of customizable items will start from the construction of a new design and production paradigm, that can involve a continuous communication to the customer, in order to define together with designers and producers the specific characteristics of the required product. It is a matter of Co-Design processes, so companies can be entities capable of producing highly customized products but on a small scale (Anderson, 2010).

At the production level, on the other hand, the specific innovations introduced will force a change of roles involved in the process, in which operators will have to develop integrated functions by overcoming traditional specializations. In this scenario, the levels of strategic skills to be developed will be multiple.

A research conducted by TabulaeX – a spin-off company of the University of Milan Bicocca, and Crisp, the Inter-University Research Center for Utilities – sought to ascertain whether and how much companies are looking for the appropriate professional skills to accompany and implement this revolution. Through the research and analysis of more than one hundred and twenty-one thousand job ads in the manufacturing sector, taken place through the WollyBi (Italian labor market digital monitor) platform, they were able to ascertain what skills are actually in greatest demand in the market (Biscella, 2016). The results of the research highlighted that there is a great demand for skills related to 4.0 innovations in the manufacturing sector. The study was also able to state what skills are the most requested and valuable. In general, the most sought skills are those related to software analysis and design, followed by automated assembly line management

skills. At the level of specific occupations, mechanical engineers and manufacturing production technicians are the most valuable (AA.VV., 2015).

This detailed analysis makes possible to detect three basic levels of skills in the area of Manufacturing 4.0: a technical-scientific one, related to the field of engineering; a technical-professional one connected to savoir-faire activities; and a managerial one, in which management competences are related to different stages and processes.

More specifically, on the subject of engineering knowledge languages dominate those related to programming and practical software management, applied mainly in the phases with less added value, mostly to speed up the placing and cutting phases. In fact, the industrialization and cutting phases are the ones that can be easily performed by software, since they are purely “mechanical”. In this area, however, there is a deficiency in the training system, which seems to disregard the software currently in use within companies (AA.VV., 2015). This happens because companies do not use a single software: usually they are too expensive or difficult to manage without adequate training support, which is often absent in the educational system.

Professional-technical skills include the knowledge related to the use of new machinery, the communication and the team working skills. This latter will be fundamental to connect different operators and to act as an integrated system. At the same time, however, the production structure requires the worker to be flexible and to develop

autonomous work management skills. Tasks are no longer related to standard process, but they are the result of continuous experimentation and adaptation, in which the worker will have to be able to self-manage to produce results. Therefore, the system has always to be able to adapt to new transformations, in which problem solving skills of operators will be crucial to cope with the management of adaptive and flexible processes (Bettarini & Tartaglione, 2018).

These paradigmatic changes lead to the identification of specific skills in mastering multiple domains of knowledge. Indeed, changes related to demand and to strong international competition have affected production and imposed the development of market analysis, research and development, production, distribution and sales activities that must be interconnected in order to make the whole process efficient and faster (Bettarini & Tartaglione, 2017).

In sum, design, technical, engineering, and management knowledges will be accompanied by soft skills of a social, managerial, and problem-solving orientation, to build a more flexible and adaptive.

Conclusions: Designer Roles Evolution

In this scenario, as pointed out by Bettarini and Tartaglione in their book “The New Professions 4.0 in the Fashion System”, companies need to work at the level of job enrichment. In specific, these new professionals will be problem-solving oriented, and

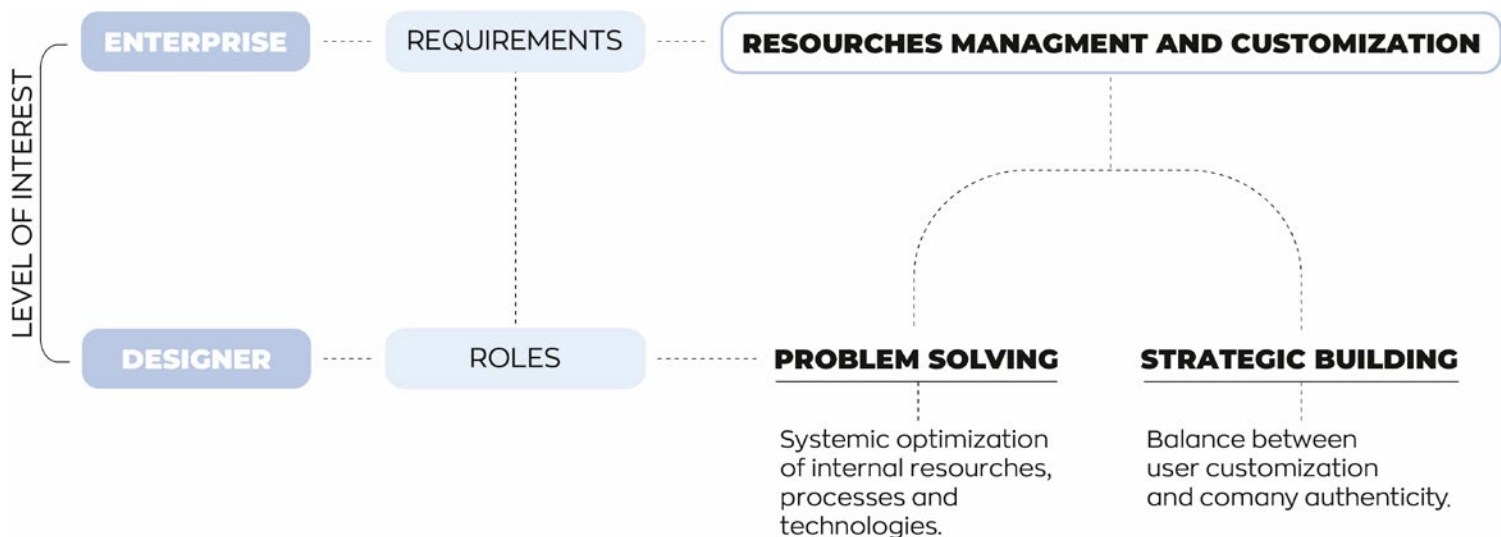


Fig. 02

they will need to develop systemic adaptability and flexibility to need the clientele requests (2018). These figures will need to share a background knowledge related to the processes and the practices of the enterprise. Indeed, this kind of management will be accompanied by the ability in mastering multiple domains and thus by the developing a multitasking approach. In order to make this process as linear as possible, the enterprise will need to be shaped a decision-making asset and operational processes in which all the involved professionals can have a straight-line communication.

Substantial change will therefore affect the profession of designer, who will act as a problem solver and strategic builder.

The designer will need to leverage design skills not only to design products, but improving design and production processes as well. In order to make processes as fast as possible and more processable throughout the chain, designers need to learn how to manage new technologies and how to combine them with more traditional practices.

As the focus of companies is more on optimizing the production process, in terms of time and cost, the designer will first need to know how to understand the issues encountered at the process level and then search for the best technological solutions. The selection of such tools will be determined by the company's economic possibilities and internal resources. In this sense, designer's work is not only aimed at the application of the most suitable technological systems, but also at the reorganization of resources at the systemic level. Thus, the optimization of the production process will come through the optimization of human and technological resources.

From a product perspective, enterprises have to meet the extremely changing and varied demands of the market. As seen, the main efforts are directed at ensuring products that can be customized.

However, the problem is to understand how a company can maintain the authenticity of its product if it can be entirely customized by the user. The designer can intervene by designing a system in which the user moves around, designing both the way in which the user provides requests and processing them in a way that is coherent to the company's cultural set-up. This initiates a strategic dialogue between enterprise, designer and user that can systematize all the options brought to bear.

Whether we are talking about optimizing the process or customizing a product, the designer must therefore understand the company's internal issues,

the market, the available technologies, and propose technologically and design-wise solutions that can bring companies closer to the 4.0 shift.

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Figure Captions

Fig. 01: Investigation field. The diagram summarizes the two main current problems of companies and the three levels where to intervene for their resolution. The first one, linked to micro and SMEs, is related to the impossibility of accessing the means; the second is linked to the inability of large companies to virtuously exploit new technologies. Source: Gianni Denaro

Fig. 02: Designer new roles. The following diagram illustrates what are the necessary requirements for a fashion company and what are, consequently, the roles that designer assumes to solve the illustrated problems. Sources: Gianni Denaro